THE REPERTORY OF PATENT INVENTIONS,

AND OTHER

Discoveries and Improvements

IN

ARTS, MANUFACTURES,

AND

AGRICULTURE;

BEING A CONTINUATION, ON AN ENLARGED PLAN,

OF THE

Repertory of Arts and Manufactures:

A WORK ORIGINALLY UNDERTAKEN IN THE YEAR 1794, AND STILL CARRIED ON, WITH A VIEW TO COLLECT, RECORD, AND BRING INTO PUBLIC NOTICE, THE USEFUL INVENTIONS OF ALL NATIONS.

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THE

REPERTORY

OF

PATENT INVENTIONS.

No. 1. Vol. XXIX. ENLARGED SERIES.—JANUARY, 1857.

Specification of the Patent granted to John Aspinall, *of Limehouse, in the County of Middlesex, Civil Engineer, for Improvements in Machinery for Curing Sugar, or Extracting Moisture therefrom, applicable to Separating Liquids from Solids.*—Dated March 3, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in certain new arrangements of centrifugal machinery for curing and extracting moisture from sugar, and for separating liquids from solids, and principally in the form of the vessel in which the liquid or moisture is extracted.

My improved machinery is made self-feeding and also self-delivering, that is to say, to deliver the sugar (or other substance operated upon), after it has been "cured," or deprived of moisture, and it is constructed in the following manner:—Through or in a line with the centre of a stationary annular hopper a shaft passes, free to revolve on rotary motion being communicated thereto; near the bottom of the hopper, and fixed by arms to the shaft, so as to revolve with it, is a conical guide or distributor. The

base of the cone is spread out at bottom, and runs parallel with the bottom of the vessel in which the "curing" or extraction of moisture is effected, but the edge of the base of the cone does not meet or touch the side of the vessel. The vessel in which the curing or extraction of moisture is effected is fixed to the central shaft, so as to revolve with it, and is itself conical; but instead of the sides of the vessel extending and widening as they rise in an unbroken line, these sides consist of gradations or steps, each higher step in succession being of greater diameter than that immediately below it. At or near the top of each step or gradation I fit a horizontal guide or plate, and on the vessel being made to revolve, the sugar (or other substance under treatment) as it rises is forced between this plate and the horizontal part of the step, and so on in succession, until the sugar or other substance rises to the top of the vessel, when the topmost guide plate directs it out of the machine on to a circular platform or other recipient. The sides of the vessel are of perforated metal or gauze, as is usual in centrifugal machines; the horizontal parts of the steps and guide plates are solid. A liquoring apparatus may be made to act on the inside of the vessel, if found necessary.

The manner in which my invention may be carried into effect is exemplified in the drawings annexed.

Fig. 1 is a sectional elevation of a machine for curing sugar, constructed according to my invention. A, is an upright shaft, stepped in the casing of the apparatus (not shown in the drawing); D, is the vessel in which the curing of the sugar or extraction of moisture is effected; this vessel is fixed on the shaft, A, and is formed of wire gauze or perforated metal stretched over ribs, *b*, *b*, following the external configuration of the vessel, and connected at top to a ring, B, and at bottom to a disc or circular plate, C, shown in plan in fig. 2, and in elevation in fig. 3. The sides of the vessel, D, are formed in steps or gradations, D^1, D^2, D^3, D^4, each higher step being of greater diameter than that immediately below it, as shown in the figure. The steps are formed by flat rings, b^1, b^1; E^1, E^2, E^3, E^4, are circular horizontal guide plates fitted within the curing vessel, resting on blocks or plates on the top of each step or gradation, and forming the vessel as it were into compartments; F, is an annular hopper fixed in the frame or casing of the apparatus. This hopper may be allowed to rest on blocks on the top ring of the casing, so as to be

easily put in place and removed. The shaft, A, passes up through an annular space in the centre of the hopper. The hopper leads at bottom into a conical guide or distributor, G, fixed by arms, *c*, *c*, to the shaft, *a*, and revolving with it. The base of the cone is spread out at bottom and forms a bell-mouth, G ^{1}, the base of which runs parallel with the bottom of the vessel, D, but the edge of the base, G ^{1}, does not touch the side of the vessel, D, a small space, *d*, being left between them. Rotary motion having been communicated to the shaft, A, (by suitable gearing actuated by a steam engine or otherwise,) and thence to the vessel, D, the sugar falling from the hopper, F, drops through the conical distributor, G, into the space, *d*, and impelled by the centrifugal action exerted by the revolution of the vessel, D, rises from step to step, being forced between the plate, E ^{1}, and the part, b^{1}, of the first step, then between the plate, E ^{2}, and part, b^{2}, of the next step, and so on successively until it reaches the top of the machine, when the top plate, E ^{4}, directs it out of the machine and delivers it "cured" on to a circular platform or other recipient. In order to facilitate the feeding of the sugar to be cured into the vessel, I place the machine (when possible) below the pan or heater, so that the sugar may be allowed to fall directly into the hopper through a shoot or otherwise.

Fig. 4, is a sectional elevation of a modification of the machine just described, in which the sides of the curing vessel are formed into only two steps intead of four, as in fig. 1. In this figure I have also represented the casing of the vessel and arrangement of platform for receiving the "cured" sugar, which may also be applied to the form of curing vessel shown in fig. 1. A, is a vertical shaft revolving in a bearing, a^{1}, in the bottom of a casing, B, (set on masonry,) and stepped at a^{2}, in a bracket, a^{3}, attached to the bottom of the casing. C, is the gearing for driving the shaft, actuated by a steam engine or otherwise. D, is the curing vessel, consisting, as in fig. 1, of wire gauze stretched over metal ribs, *b*, *b*, and connected to top and bottom rings, D ^{1}, D ^{2}; the shaft, A, in this case does not pass up entirely through the vessel, D, which is fixed to it at *e*, and revolves with it. The sides of the vessel are formed in steps having annular ribs or rings, *f*, *f*, extending round the vessel, the circumference of the higher step being greater than that of the step below it. E ^{1}, E ^{2}, are circular guide plates fitted horizontally round the inside surface of the vessel, D, near

the top of each step but not fixed to the machine, so that they are free to move to a certain extent, as to be presently explained. F, is a stationary hopper resting at top on a ring, f^1, attached to the top of the casing by arms. G, is a conical guide or distributor, fixed on and revolving with the shaft, A, and formed with a bell-mouth, G^1, precisely as the distributor indicated by the same letters in fig. 1. B^2, is an external casing surrounding the upper part of the casing, B, intended to receive the sugar as it is driven from the curing vessel, and to direct it on to a circular revolving table or platform, H, which is mounted on friction rollers, g, g, centered on brackets, h, h, fixed on the sides of the casing, B. Rotary motion is communicated to this table, H, by a strap passing over a pulley, J, keyed fast to a shaft, j, on which one of the friction rollers, g, is mounted. The sugar, on emerging from the curing vessel, passes through the outer casing, B^2, on to the revolving table, H, from which it is removed or delivered at one part only by a scraper, K; k, k, are friction rollers mounted on brackets, affixed to the side of the casing, B, for keeping the table at a proper distance from the casing, to prevent it from becoming locked or jammed. On each ring, f, forming the periphery of each step of the curing vessel, is fixed a bracket, l, on which is centred a bell-crank, m; one of the arms, m^1, of the bell-crank bears against a projection, stud, or rim, n, formed on the upper side of the plates, E^1, E^2, while on the opposite arm, m^2, of the bell-crank is fixed a weight, o. As the vessel rotates, the sugar falls from the hopper, F, through the guide, G, to the bottom of the vessel, D, and passed up impelled by the centrifugal action of the machine until it lodges under the first guide plate, E^1, where it is retained by the weight, o, and bell-crank, m, until the weight or pressure of sugar beneath the plate overcomes that of the weight, o, when the sugar will lift up the plate, E^1, and pass up into the compartment between it and the plate, E^2, where the same action takes place until the sugar is delivered out of the machine on to the platform, H. The sugar being thus retained for a short time is more completely "cured" or deprived of its moisture than it would be if allowed to pass out of the machine without encountering any impediment. In fig. 4, the lower plate, E^1, is shown as closed or down, while the upper plate, E^2, is represented as lifted up or open to allow the sugar to pass up.

In the figures the vessels are represented with sides formed into two and four steps, but I do not confine myself to either number, as vessels with sides formed of three or any other number of steps may be adopted.

Although in the preceding description I have alluded to sugar as being the substance acted on by the apparatus, the improved machinery described in the present specification is equally applicable to extracting moisture from other substances than sugar, and also for separating liquids from solids, the vessel which in the foregoing description has been referred to as serving for the curing of sugar being in these cases the vessel in which the separation of liquids from solids or extraction of moisture is effected.

And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the curing of sugar, extracting moisture from substances, and separating liquids from solids, by causing the substances, which are to be operated upon, to enter at or near the bottom of a vessel, in the form of an inverted cone, with regular or irregular sides or walls, and to be delivered "cured" or freed from moisture at the mouth or top of the vessel.

Second, the improved construction of vessel for curing and extracting moisture from sugar, and for separating liquids from solids, with its sides arranged stepwise, or formed into gradations, each step being of greater circumference than that immediately below it, all as hereinbefore described with reference to the drawings annexed.

Third, the particular configuration of curing or extracting vessels hereinbefore described and represented in figs. 1 and 3 of the drawings annexed.

Fourth, the construction and method of action of the circular plates or guides for guiding, retaining, and delivering the sugar (or other material acted on), all as hereinbefore described with reference to the drawings annexed.

And, lastly, the general construction, arrangement, combination of parts, and method of action of the machinery for curing sugar, extracting moisture, and separating liquids from solids, all as hereinbefore described and represented in the drawings annexed.—In witness, &c.

John Aspinall.

Specification of the Patent granted to WILLIAM LYNN, *of Her Majesty's Dockyard, Portsmouth, Assistant Inspector of Machinery, for Improvements in the Construction and Mode of Applying Screws for Propelling Vessels.*—Dated February 20, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—These improvements refer to a novel mode of constructing the blades of screw propellers, by which they may be separately fitted on to or removed from the shaft, for the purpose of being replaced in case of damage or from any other cause, and by which peculiarity of construction spare screws can be more conveniently stored or carried on board of ship.

Instead of casting the blades of the screw together with the boss and shaft, or, as is frequently done, casting them solid with the boss, the eye of the screw being afterwards bored and fitted on the shaft, my improvements consist in casting the blades separately, with a portion only of the length of the boss or eye cast therewith, and afterwards fitting the parts of the boss together in such a manner as to secure them to the shaft, and form a solid screw when keyed up or fixed by collars. Thus, for instance, in applying my invention to a double-bladed screw, I form the boss in the manner of jointing hinges, viz., with a nuckle joint, as shown in the accompanying drawing, the boss being divided in its length into, say, four parts. The male portion is formed in the middle of the boss of one blade, and is about two-fourths of the whole; whilst the other blade has the female portions of the boss divided into two lugs or cheeks, each of about one-fourth, the male and female portions of the boss being accurately fitted together. The eye is made to receive the screw shaft or T-headed piece of shaft, upon which it is fitted, and may be secured by means of a feather.

In the accompanying drawing, figs. 1, 2, 3, 4, 5, and 6 exhibit various views of the blades of my improved screw propeller in different positions, and which from their simplicity and distinctness need no minute explanation.

Fig. 7 is a side view of a short T-headed piece of shaft, the T-piece of which takes into a groove or slot in the end

of the screw shaft. The same letters of reference indicate corresponding parts on each figure relating to the improved screw propeller.

a, is the one blade having the single nuckle or male portion of the joint, *b*; *a*[1], is the corresponding blade, having the double nuckle or female portion of the joint *c*, *c*; *d*, the eye or hole through the boss of the screw blades; *e*, the shoulder of the single nuckle, or male portion of the joint or boss, and which abuts on and forms a stop into the recess formed upon the top sides of the double nuckles or female portions of the joint or boss.

In fig. 7, *f*, is that portion of the shaft upon which the boss of the screw is fitted, there being a feather thereon, which fits or takes into the slot or groove made in the eye or hole, *d*, of the boss of the screw blades; *g*, is the shouldered end or outer bearing piece for supporting the weight of the screw, *h*, being another or inner bearing or journal; *i*, is the T-head, which takes into a slot in the end of the screw shaft, and by which the screw is propelled or caused to revolve.

Although I have shown a double-bladed screw, I do not confine myself to that number, but apply the same principle of construction to other forms of screw and other numbers of blades. And I do not confine myself to the fitting of separate blades (made according to my invention) on to a T-headed short shaft, as they may be fitted directly on to the outer end of the main screw shaft or otherwise; but I claim as my invention the construction of the blades of screw propellers in the manner described.—In witness, &c.

WILLIAM LYNN.

Specification of the Patent granted to ROBERT SAM NORTH, *of Derby, in the County of Derby, Engineer, and* RALPH PEACOCK, *of New Holland, in the County of Lincoln, Engineer, for Improvements in Metallic Packings for Pistons.*—Dated January 4, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— This invention has for its object improvements in the construction and combination of flat spiral springs and metallic

rings used for packing pistons. In the groove or space around the body of the piston, and between its upper and lower plates, a flat spiral spring the width of the packing space is fixed, clipping the body of the piston, and on this flat spiral spring are placed three metallic rings to form the packing, such rings having a tendency to expand in diameter when permitted so to do. The first or chief ring is by preference formed flat on its inner surface, with a rib or projection on its outer surface. This ring fits into the groove or packing space of the piston around the flat spiral spring, and the rib or projection on its outer surface comes against the cylinder in which the piston works. The two other rings are flat on both the inner and outer surfaces, and are respectively placed on the two sides of the rib or projection on the first or chief ring, and they come flush with the outer surface of the rib or projection on the first or chief ring, and thus their outer surfaces and the outer surface of the rib or projection constitute the wearing surfaces of the metallic packing. Each of the rings is cut across or open at one part of its circumference, and these cuts or openings, when the packing is put together, are to be at a distance from each other, which is called "breaking joint;" although the use of three rings is preferred, as above explained, their number may be varied.

These our said improvements will be more clearly understood by reference to the accompanying drawings, in which the same letters of reference represent the same parts in all the figures.

Figs. 1 and 2 are sections of a piston, showing the body of the piston, piston rod, spring, and rings. A, is the body; B, the rod; C, the spring; D, the first or chief ring; and E, the smaller rings. It will be seen that the smallest diameter of the spring clips the body of the piston, and the largest diameter of the spring presses against the inside of the first or chief ring, thereby giving an equal pressure all round the packing. In adapting this packing to existing pistons of the ordinary form, we shrink a ring on the four lugs, as shown in fig. 3. On this ring is placed the spring, clipping the body of the piston with its smallest diameter. The rings are then placed on the largest diameter of the spring. The spring and rings should be the same width as the packing space.

Fig. 4 is a section of the packing where four small rings are used in conjunction with the first or chief ring.

Having thus described the nature of our said invention, we would have it understood that we do not confine ourselves to the exact details described; but what we claim is,—

Firstly, the use of a spring coiled round the body of the piston, and pressing on the rings, in the manner shown and described.

Secondly, the use of a flanged ring, D, in combination with smaller rings, E, which rest on its flange, as shown and described.—In witness, &c.

ROBERT SAM NORTH.
RALPH PEACOCK.

Specification of the Patent granted to WILLIAM CLAYTON, *of Watling-street, in the City of London, Perfumer and Soap Manufacturer, for An Improved Manufacture of Soap.*—Dated March 26, 1856.

To all to whom these presents shall come, &c., &c.—The chief object of this invention is so to modify the character of toilet soap as to render it an emollient of the skin, and thereby to prevent or remove the tendency of the skin to crack when exposed to extremes of temperature. To this end, I propose to add to soap made in the ordinary manner, or by any of the recently patented plans, bees-wax, or what is known in the market as vegetable wax, in the proportion of from one to two parts by weight for every sixteen parts of soap. The amount of wax added to the soap may be varied, but I prefer an approximation to the above-named proportion. The wax may be mixed with the ingredients composing the soap during the process of manufacture, or it may be added afterwards; this latter plan I prefer when preparing toilet soaps according to my invention. In this case I take the soap as it comes from the frame and remelt it, and then add the wax thereto, keeping the fluid body well stirred until a thorough incorporation of the wax is effected. The soap may then be made up into cakes or blocks of any required form, to suit the varying taste of purchasers; or if the soap is required to be scented, that operation may be performed in the ordinary manner.

By the use of soap prepared with an admixture of wax, as above described, I find that, besides the advantage men-

tioned above, it is capable of producing a good result in the getting up or finishing of lace, muslins, and other fine goods, as the improved soap is calculated to impart an amount of stiffness thereto, sufficient to give a good appearance to the fabrics, thus rendering it unnecessary to employ starch in preparing the fabrics for the market.

Having now set forth the nature and object of my invention of "An Improved Manufacture of Soap," and explained the manner of carrying the same into effect, I wish it to be understood that under the above in part recited letters patent I claim the application to soap of bees-wax or vegetable wax in the manner and for the purpose above described.—In witness, &c.

WILLIAM CLAYTON.

Specification of the Patent granted to BONNET FREDERIC BRUNEL, *of Hampstead-road, in the County of Middlesex, Chemist, for Improvements in the Manufacture of Prussian Blue.*—Dated March 27, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in adding to the ingredients usually employed in the manufacture of prussian blue, chromic acid and oxalic acid, in mixing the whole together in a precipitating vessel, and in the application thereto of a current of electricity.

I dissolve in water in separate vessels (so constructed as to allow of heat being applied thereto) yellow ferrocyanide of potassium, protosulphate of iron, and sulphate of alumina (salts now used in the manufacture of prussian blue), and when at the desired degree of concentration I pour them into a precipitating vat together with chromic acid and oxalic acid, and excite their action by an electric current from the two poles of a battery led into the vat, for a period depending upon the quantity operated upon. On cutting off the electric current, the matters are allowed to precipitate for from ten to twelve hours (more or less), the supernatant liquor is drawn off, and the precipitate withdrawn from the vat. This precipitate is prussian blue in a more or less thick paste, which is allowed to drain, then pressed and dried.

Instead of placing in the precipitating vessel chromic

acid previously prepared, or in a state of acid, I sometimes place in the vessel bichromate of potassa, which becoming decomposed in the course of the operation, chromic acid is formed therefrom; or in other words, this acid is formed in the precipitating vat itself, and answers precisely the same object as chromic acid previously prepared would have done.

My invention may be carried into effect in the following manner:—I employ ferrocyanide of potassium, known as the yellow prussiate of potash of commerce, protosulphate of iron (green copperas of commerce), sulphate of alumina (alum), oxalic acid, and chromic acid; or I improve the product by adding hydrochlorate of peroxide of manganese, in which case I adopt the following proportions (though I do not confine myself thereto):—

20	parts	ferrocyanide of potassium,
30	„	protosulphate of iron,
30	„	sulphate of alumina,
3	„	oxalic acid,
3	„	chromic acid, and add
14	„	hydrochlorate of peroxide of manganese; making
100		

Or 20	parts	ferrocyanide of potassium,
30	„	protosulphate of iron,
30	„	sulphate of alumina,
3	„	oxalic acid,
1	„	chromic acid,
3	„	bichromate of potassa,
13	„	hydrochlorate of peroxide of manganese.
100		

The bichromate of potassa may or may not hold chromic acid in solution.

The foregoing proportions are not based on the weight or volume of the substances in a solid state, but on the degrees of density of the matters in liquid and of the solutions. To arrive at these proportions, I prepare a solution of each salt in a separate vessel, and ascertain their respective densities by means of Beaumé's aërometer; I then calculate their relative proportions, whereby I determine the quantity of each solution I shall require. Thus, for example, if the degrees indicated correspond precisely to

the proportions given above, and the vessels holding the solutions be filled equally, then the whole of each solution would be required; (the peroxide of manganese should be digested in hydrochloric acid ;) or the proportions required of each solution may be ascertained by calculating the degrees of concentration and taking as a base the proportions I have just mentioned.

But I occasionally vary the foregoing proportions; as, for example, for different shades of blue I increase the quantity of sulphate of alumina from thirty parts up to, say, 100 parts or more; again, when the protosulphate of iron happens to be a subsalt, the quantity of hydrochlorate of manganese should be increased to, say, twenty parts, to make up the deficiency of acid; but when a supersalt, the quantity may be diminished to eight parts. I prefer to use filtered or potable water for the purposes of my invention. Having thus prepared the solutions in separate vessels, and ascertained the quantities I shall require of each, I first introduce into a precipitating vat the proper proportions of the ferrocyanide of potassium, protosulphate of iron, and sulphate of alumina, and stir them well together to facilitate their combination and chemical action; I then lead the two poles of a powerful battery into the precipitating vat, and pass electric currents through the solutions all the time they are being poured in; after the whole is in, I stir the mixture for about a quarter of an hour, (more or less,) and add (in their respective proportions) first the oxalic acid, then the hydrochlorate of manganese, and lastly the chromic acid or bichromate of potassa, keeping up the electric currents the whole time and stirring at intervals. About ten minutes after adding the bichromate of potassa the electric current is cut off.

The matters are then left to precipitate or deposit for ten to twelve hours, and the supernatant liquid drawn off. The sediment deposited is prussian blue, which should be left to drain for about forty-eight hours on cloth or other porous material, next subjected to pressure, and then dried in a drying chamber or otherwise. If preferred, however, the pressing may be dispensed with. The quantity and intensity of the electric currents are regulated according to the quantity and degree of concentration of the liquid matters under treatment; the higher the degree of concentration the more energetic should the current be.

The currents of electricity used in my process exert a

vigorous action on the saline molecules, which they separate or tear into the most minute particles conceivable, and carry them through the excipient liquid, wherein some are attracted to the positive and others to the negative pole, throwing them into continuous contact, which facilitates the chemical action of the matters upon each other. The currents of electricity also decompose the water in the precipitating vat, and resolve it into its constituent gases, hydrogen and oxygen. A portion of the oxygen passes to the iron and increases its oxidation, while the hydrogen is liberated and allowed to escape.

The electric currents, moreover, decompose the hydrochloric acid into its constituents, hydrogen and chlorine. When I employ bichromate of potassa, the currents of electricity, aided by the sulphuric acid, (and also by the hydrochloric acid, when hydrochlorate of peroxide of manganese is used,) decompose the bichromate of potassa, and the sulphuric and hydrochloric acids, combining with the potassa and oxide of the bichromate, liberate the chromic acid in the course of the operation, in which it answers the same purpose as chromic acid would have done if previously placed in the vat in a state of acid, as before stated. I thus obtain a cheap chromic acid. When the chromic acid passes on to the iron, hydrocyanic acid is produced.

The electric currents also decompose the hydrochloric acid into its constituents, hydrogen and chlorine, and thus chlorine may be obtained from the mixture. To the employment of chromic acid, the process is indebted for the rapidity with which the blue colour is obtained when protosulphate of iron is used, the oxide of which is in the first stage of oxidation of which that salt is susceptible. I employ oxalic acid for the purpose of dissolving the heterogeneous and extraneous matters with which the protosulphate of iron of commerce is commonly combined, as during crystallization iron is collected in a state of oxide, or in a state of sulphuret when the sulphate is made from ferruginous pyrites. By means of my invention, not only are time and labour saved in the process of manufacturing prussian blue, but a stronger and better, as well as cheaper colour is produced.

And having now described the nature of the said invention, and in what manner the same may be performed, I declare that I claim,—

First, the employment in the manufacture of prussian

blue of oxalic acid and chromic acid in addition to the ingredients hitherto usually employed, and the passing of currents of electricity into and among the same, and

Second, the manufacture of prussian blue in the manner hereinbefore particularly described.—In witness, &c.

BONNET FREDERIC BRUNEL.

Specification of the Patent granted to JOSEPH GILBERT MARTIEN, *Newark, New Jersey, in the United States of America, but now residing at* 32, *Essex-street, Strand, London, for Improvements in the Manufacture of Iron.*— Dated April 4, 1856.

To all to whom these presents shall come, &c., &c.— In the specification which I filed, in pursuance of letters patent, granted to me by Her said Majesty, bearing date the 15th day of September, 1855, I described a mode of purifying iron when in the liquid state after being drawn from the blast furnace by means of atmospheric air or steam applied below, and so as to rise up through the liquid metal. The invention, mentioned in the letters patent above recited, consists in using or applying certain materials to the liquid iron thus subjected to the action of air or steam, for the purpose of purifying or assisting in the purifying of the iron. And I use or apply those materials to the iron in the liquid state in which it comes from the furnace, in such manner that they shall become blended with or disseminated through the metal, so as to act upon every part of it as far as practically may be.

When the iron to be purified contains sulphur, I use chlorine for the purpose of purifying the iron from the sulphur, and the chlorine being in a gaseous state, I blow it into the iron, in the same manner as described in the said specification of my said former letters patent, and, either alone or mixed with air, through separate tuyeres, or through the same tuyeres as the air employed in the purifying process. The quantity of chlorine to be used must depend upon the quantity of sulphur in the iron, and I use such a quantity of the chlorine as will combine with and carry off all the sulphur.

When the iron to be purified contains sulphur and also

some oxide of iron, I use hydrogen or carburetted hydrogen (coal gas), in order to reduce the oxide to a metallic state, and to combine with and carry off the sulphur, and I apply such gas in the same way as chlorine; but if the gas be mixed with air, great care must be taken not to mix the air and gas in such proportions as to form an explosive compound.

When iron contains either at the commencement or at any other part of the process oxide of iron as well as sulphur, it may be convenient first to use chlorine for the purpose of carrying off the sulphur, and afterwards to use hydrogen or carburetted hydrogen for the purpose of reducing the oxide to a metallic state. In order to assist in purifying the iron from silica and make it work more kindly, I add to the iron, as it flows from the blast furnace or immediately after, about three per cent. of oxide of manganese either alone or mixed with either of the materials hereinafter mentioned. I prefer to blow this oxide into the fluid metal by means of air, in the same way as the air used for purifying the metal is blown into it, or the powdered oxide may be blown in through the same tuyere as or together with that air. Oxide of zinc may also be used in the same manner in order to assist in decarbonizing the liquid metal.

There is a well-known natural mineral or metallic substance called spathose ore, containing, as I believe, carbonates of the oxides of iron and manganese, and some other elements. In order to decarbonize or assist in decarbonizing the liquid iron to be purified, I add to it about five per cent. of the spathose ore, and I prefer to add it in a powdered state, and to blow it through tuyeres into the liquid iron, in the same way as the oxide of manganese. And in order to make the iron work more kindly, I use, together with the oxide of manganese or spathose ore, or mixed with them or either of them, about two per cent. of clay which is free from silica, and I dry and powder the clay and add it to the iron, in the same way as the oxide of manganese and spathose ore.

When chlorine is not used in purifying the iron, chloride of sodium may also be used, mixed or together with any of the materials above mentioned; but I do not claim the use of chloride of sodium as any part of my invention. Instead of blowing the solid matters above mentioned into the liquid metal, they may be added to it in any other way, taking

care to stir up the metal, or use other sufficient means to cause them to be thoroughly mixed with it.

Having now particularly described the nature of my said invention, comprised in the said firstly hereinbefore mentioned letters patent, and also the manner in which the same is to be performed, I declare that I claim as of my said invention the use or application of chlorine, hydrogen, carburetted hydrogen, oxide of manganese, oxide of zinc, spathose ore, and clay, for the purpose of purifying or assisting in the purifying of liquid iron from the blast furnace, in manner above described.—In witness, &c.

JOSEPH GILBERT MARTIEN.

Specification of the Patent granted to THOMAS WILLIAMS MAKIN, *of Longsight, near Manchester, in the County of Lancaster, Silk Finisher, and* JOHN BARNSLEY, *of Stockport, in the County of Chester, Engraver, for Improvements in Machinery or Apparatus for Embossing Moiré Antique Water on all Kinds of Woven Fabrics.*—Dated April 11, 1856.

To all to whom these presents shall come, &c., &c.—Our invention relates to an improved method of giving a watery or wave-like appearance to woven fabrics, a style of pattern or design familiarly known as "moiré antique," which has hitherto been accomplished by damping the goods and then subjecting them to pressure, a plan which is evidently very uncertain in its results, it being quite impossible to produce two pieces with the same design, the pattern varying at every operation. Instead of the said uncertain process, we use rollers with the desired design or style of pattern engraved, embossed, or stamped thereon, which we produce by stamping or pressing such parts of the roller as will leave the design projecting on the surface. We place one of the said rollers in any convenient machine, so that it will revolve in bearings and in contact with another roller of a plain surface (a plan well known by all persons conversant with finishing woven fabrics); we cause the material to pass through or between the said rollers as they revolve, by which the desired pattern or watering design is given to it. By this plan it is evident

we can impart the same design to any reasonable number of pieces, and by changing the rollers we can produce any number and variety of designs.

Having thus fully described the nature and particulars of our said invention, and the manner of carrying the same into practical effect, we desire it to be distinctly understood that we claim as our invention, and which, to the best of our knowledge and belief, has not been hitherto used within this realm, the use of engraved, embossed, or stamped rollers for giving to woven fabrics a waved or watery design or appearance, as herein described.—In witness, &c.

THOMAS WILLIAMS MAKIN.
JOHN BARNSLEY.

Specification of the Patent granted to JOHN LEIGH, *of the City of Manchester, in the County of Lancaster, Surgeon, for The Use or Application of a certain Substance or Substances in the Sizeing, Stiffening, or otherwise Preparing Cotton, Linen, or other Yarns and Woven Fabrics.*—Dated April 7, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists of the application of silicate of soda or silicate of potash to the sizeing, dressing, stiffening, or otherwise preparing yarns and woven fabrics, instead of flour starch, or other substances hitherto used for that purpose, which silicates I use either alone or in combination with sulphate of barytes, flour starch, or other similar substances. The said silicates may be prepared by fusing together in a suitable furnace pure white siliceous sand, quartz, or similar matter with caustic soda or carbonate of soda, caustic potash, or carbonate of potash, in proportions varying with the solubility or alkalinity of the silicates intended to be obtained. A little charcoal may be mixed with the sand or quartz, and the said carbonates if desirable, but care must be taken that no lime or alumina be present in undue quantity, as it would render the resulting glass less soluble. The proportions for making the silicate of potash may be about equal weights of clean sand or quartz and dry carbonate of potash, and for the silicate of

soda about equal weights of clean sand and soda ash, containing about fifty per cent. of real alkali; but these proportions may be varied according to circumstances, or to answer the purpose for which the respective silicates are intended; but as they are articles of commerce it is unnecessary for me to describe their mode of manufacture more particularly. For the application of the silicates to the before-mentioned purpose or purposes, I dissolve them by steam or hot water in suitable vessels made of copper, or clean iron, or other suitable material. To the solution, thus obtained, I add so much of a solution of hypochlorite of lime or soda (commonly called bleaching liquor) as may destroy any brown tint, and render colourless the dissolved silicates; the liquor must be briskly agitated or stirred during the whole time of the addition. I then cautiously and slowly pour in so much of a diluted acid (and I prefer to use the sulphuric acid of commerce diluted with about eight parts of water) as shall take up any free alkali that may exist in the silicate of soda or potash; I add the diluted acid with brisk agitation until flocks or flakes of silica begin to separate from the solution and float in the mixture; but if the quantity of free alkali be inconsiderable, it may not be necessary to introduce the acid, although I prefer to do so. I pour the solution of silicate of soda or potash thus prepared into clean boilers, made of copper or iron, and boil it down to the strength required, which will vary with the weight or quality of the cloth to be manufactured, and when cool I pour it into clean glass carboys ready for use. For sizeing with this solution, it must be reduced to the requisite consistency by the addition of clean water or steam to the gravity required; but it will be clearly evident that the said consistency must vary according to the kind of cloth for which the yarn is intended, or the particular purpose for which it is to be employed. The said reduction of the solution may be effected in the sizeing trough or sizeing vessel, which ought to be made of copper, clean iron, or other suitable material. A quantity of tallow, or other grease or soap, may be introduced at the same time into the trough or sizeing vessel, as is often done in sizeing with flour paste.

Having thus fully described the nature and particulars of my said invention or discovery, and the manner of carrying the same into practical effect, I desire it to be distinctly understood that I do not claim any particular method of

making or manufacturing the silicates of potash or soda, nor any particular form or construction of apparatus for sizeing, dressing, or stiffening;—

But I claim as my invention or discovery, and which, to the best of my knowledge and belief, has not been hitherto used within this realm, the use or application of silicate of potash and silicate of soda, however the same may be made or prepared, either alone or in combination with other substances, for preparing, sizeing, dressing, or stiffening yarns or woven fabrics, as herein described.—In witness, &c.

JOHN LEIGH.

Specification of the Patent granted to GEORGE LURIG, *of the Town of Adelebsen, Hanover, residing in Paris, Soap Manufacturer, for Improvements in the Process of Manufacturing Saltpetre.*—Dated April 18, 1856.

To all to whom these presents shall come, &c., &c.—The invention consists in manufacturing saltpetre by treating, in the manner subsequently described, first, the common potash of commerce (carbonate of potash); secondly, sulphate of potash; thirdly, nitrate of soda; fourthly, quick lime.

First Process.

The proportions of the above materials which I use in this process are as follows:—Sixty pounds carbonate of potash, forty pounds sulphate of potash, one hundred and forty pounds nitrate of soda, one hundred and eighty pounds quick lime. These quantities of carbonate and of sulphate of potash and of nitrate of soda are placed together in a large boiling pan or kettle, with enough water to dissolve them, heat being applied. When the liquor after boiling for some time comes to mark twenty degrees on Beaumé's saltareometer the fire is stopped, and the one hundred and eighty pounds of quick lime above mentioned, being placed in a tub large enough for that purpose, the solution is poured from the boiling pan on the quick lime, which is dissolved by it. As soon as this result has been attained the mixture is stirred for a few minutes, in order to get the compounds perfectly mixed together. After

allowing it to settle for three or four hours, the lime gathers to the bottom, the superincumbent liquor is drawn off into a boiling pan of suitable dimensions prepared for that purpose; but as all the alkaline salts cannot be taken up from the lime by a first drawing, a fresh quantity of water is poured into the boiling pan or kettle, and the same operation is repeated as at first, that is to say, the liquor is stirred up again and left to settle, it is then drawn off as before, and this second liquor is mixed in the boiling pan with the first. The fire is then kindled under the boiling pan or kettle containing the above drawn off liquors, which are boiled down till they mark twenty-five degrees of Beaumé's aërometer. When the solution or lye thus prepared has attained this degree of concentration, it may be used for manufacturing hard soap of any kind, and it is only after the alkalies have been separated that the saltpetre is manufactured. Thus, for manufacturing the soap, the sediment in the boiling pan is taken out, whilst for manufacturing saltpetre, the liquor is drawn off and carried in another boiling pan, where it is boiled down till it marks thirty-three degrees on Beaumé's aërometer; the liquor is then left to stand until it is lukewarm, and it is run out into a tub prepared for its reception, where it is left at rest for twenty-four hours. At the end of that time the mother liquor is drawn off from the crystals produced, by means of a cock or otherwise, and all the crystals deposited over the sides and bottom are saltpetre; the mother liquor, however, contains some saltpetre still, but as it is not strong enough to yield it by crystallisation, it should be concentrated anew; it is accordingly poured out again into the kettle or pan and boiled down till it marks thirty-three degrees, when the same process as before described is repeated. All the liquors which have been submitted to the above process may yield a residue of saltpetre.

Second Process.

Saltpetre may also be manufactured with the same materials as before stated, mixed together in the following proportions: — Seventy pounds carbonate of potash, forty pounds sulphate of potash, one hundred and ten pounds nitrate of soda, and one hundred and eighty pounds quick lime. Saltpetre is obtained by this process, following the same method as in the first instance; the liquor should, however, be boiled down a longer time in order to con-

centrate it to forty-two instead of thirty-three degrees of Beaumé's aërometer, as in the first process.

In order to obtain crystallized saltpetre by this method as many drawings off as possible should be effected, that is to say, until the liquor concentrated to forty-two degrees fails in giving crystals by cooling; the remaining liquor is only a solution of potash, with which all kinds of soap can be manufactured, or from which refined potash (pearlash) can be obtained. All the alkalies, alkaline sulphates, and nitrates may be used in a similar manner for obtaining the same result, namely, saltpetre, by the methods hereinbefore described.

It is clear that the proportion of the above-mentioned materials which enter in the composition of the liquors, lees, solutions, or mixtures used for manufacturing saltpetre through the hereinbefore described processes, may be modified;—

But my invention consists, as before stated, in manufacturing saltpetre by using common potash of commerce (carbonate of potash), alkaline sulphates, nitrate of soda, and quick lime, in variable proportions, and in the manner hereinbefore described.—In witness, &c.

GEORGE LURIG.

Specification of the Patent granted to VICTOR DOAT, *of Albi, in the French Empire, Gentleman, for An Improved Galvanic Battery, and Method of Recovering and Revivifying the Agents Employed.*—Dated April 24, 1856.

To all to whom these presents shall come, &c., &c.—

My improved galvanic battery is composed thus:—

First, mercury, either pure or in amalgam, is employed as the electro-positive metal;

Second, iodide of potassium, or any other alkaline or earthy iodide, is used instead of the acids or salts in solution of ordinary batteries;

Third, iodine dissolved in an alkaline iodide is used, instead of the substances usually employed, to surround the negative pole, prevent polarization, and produce constant effects. I employ carbon as the negative pole.

The mercury is introduced into a cell or vessel, round,

square, or otherwise shaped, and made of glass, earthenware, or gutta percha; a concentrated solution of iodide of potassium is placed on the mercury. The carbon pole is inserted in a porous vessel, about three-fifths of an inch (more or less) from the mercury, and surrounded with a solution of iodide of potassium saturated with iodine.

The method of recovering or revivifying the agents is as follows:—After the battery has been at work, the saturated solution is drawn off, and I recover, first, the iodide of potassium, by heating the liquid in a capsule with a receiver at top, when the periodide of mercury formed during the action of the battery will be volatilized and condensed on the top of the receiver.

Second, the mercury is recovered by treating the periodide with dissolved caustic baryta, oxide of mercury and iodide of barium will be formed. In order to separate the oxide of mercury, I heat it in a capsule covered by a receiver, when the oxide will be decomposed by means of the heat, and yield metallic mercury.

Third, the iodine is recovered by heating the iodide of barium in presence of the oxygen, resulting from the decomposition of the oxide of mercury, and conducted to the iodide through a tube. The iodine driven off by the oxygen will be condensed in the receiver over the capsule containing the iodide of barium, and the caustic baryta which will remain may be used again.

The iodine, iodide of potassium, and mercury may be recovered by a cold process in the following manner:—Into the liquid drawn off from the battery I throw fragments of metallic copper, which, being of a more electro-positive nature than mercury, reduces it to a metallic state, and iodide of copper will be formed, which will dissolve in alkaline iodide. This solution is treated with hydrated carbonate of bioxide of copper or other subsalt of copper, the iodine is eliminated and an oxide of copper formed at the cost of the iodide of this metal, while the carbonate of bioxide passes into a state of carbonate of protoxide. I then filter, in order to separate the iodine dissolved in the alkaline iodide, and a combination of oxide and carbonate of copper will remain. This substance is beaten to a powder together with charcoal dust, and placed in a crucible and heated in a furnace (having a strong draft). Metallic copper is thus obtained, which may be used over again to precipitate the mercury.

As pure metallic mercury does not possess as much electro-motive strength as certain other metals of a more electro-positive nature, this strength may be increased by mixing zinc, tin, or other electro-positive metal with the mercury, in order to form a liquid amalgam therewith; the agents would be recovered by caustic baryta and carbonate of copper. In this case oxides of the amalgamated metals would be formed. If baryta be used, it should be filtered in order to separate the iodide of barium dissolved in the iodide of potassium; the iodine is driven off by heating this double iodide in a capsule covered by a receiver, a current of atmospheric air being conducted through a tube in order that the action of the oxygen contained in the air may be employed. The metallic oxide which remains is pounded on the filter with powdered charcoal and heated, when a metallic product will be obtained.

If carbonate of copper be employed, the iodine is obtained pure and dissolved in iodide of potassium. I filter, in order to eliminate this product, which may be replaced in the cells of the battery, and I pound up the insoluble product together with powdered charcoal. The insoluble product would be a mixture of the oxide of the metal forming the amalgam and the carbonate of copper; I warm it in a crucible and obtain a metallic residuum, which is a description of brass or bronze available for commercial purposes. The characteristic or advantage of iodine in the battery is, that it produces both constancy and intensity at the same time. The advantage of using mercury or liquid amalgam is this, that when these agents are employed, the quantity of electricity may be regulated by inclining the vessel in which they may be contained, thereby diminishing the extent of metallic surface.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the improved galvanic battery, composed of the elements or agents hereinbefore mentioned, and as hereinbefore described, especially in so far as regards the employment of iodine and of iodides.

Second, the method of recovering the agents employed, as hereinbefore described.—In witness, &c.

VICTOR DOAT.

Specification of the Patent granted to THOMAS SQUIRE, *of Latchford, in the County of Chester, Tanner, and* CHARLES FREDERICK CLAUS, *of the same place, Practical Chemist, for Improvements in the Manufacture of Artificial Manure.*—Dated April 23, 1856.

To all to whom these presents shall come, &c., &c.—Our invention consists in dissolving animal substances, such as hair, wool, hoof, horn, woollen rags, shoddy, or other substances, chemically similar, by means of liquids containing sulphuret of calcium, sulphuret of sodium, sulphuret of ammonium, or sulphuret of magnesium (alone or mixed) with any of the preceding or above-mentioned substances. The sulphuret of magnesium may be obtained by treating magnesia limestone in the manner described in the specification of a patent granted to Charles Claus, bearing date August 23, 1855, relating to lime or salts of lime. It may also be prepared by treating sulphate of magnesia with carbonaceous matters. The above-mentioned liquids containing sulphuret of calcium and sodium may be obtained from alkali waste, from gas waste, or otherwise, by the process described in the specification of a patent for removing hairs from hides or skins, granted to Thomas Squire, bearing date April 5, 1855; and also in that of a patent granted to Charles Claus for a similar purpose, bearing date August 23, 1855. The process we have found to answer is as follows:—The above-named dissolving liquids are kept in suitable tanks or vats, and in such the animal substances before mentioned are immersed. To facilitate this operation, I prefer to place the same into hampers or perforated boxes, by means of which they can be readily immersed or removed from the liquids aforesaid. After the liquids have acted a sufficient length of time, which will depend upon the nature of the substances, whether hoof or hair, &c., and also on the strength of the dissolving liquids, a part of the hair, &c., will be dissolved into a liquid and part into paste. The former, if not perfectly charged with animal matters, may again be used for dissolving a further quantity until it is spent or will dissolve no more; both may then be employed either directly as manure, or may be evaporated to dryness. To the latter course, we, however, prefer to treat them by means of

acids, particularly phosphoric acid, by which treatment the dissolving agents, that is to say, sulphuret of calcium, is neutralized, and a precipitate is formed, which is decanted or filtered off, and may be used for manure as it is, or dried by slow heat.

Having described and ascertained the nature of our invention, and the manner in which the same is to be performed, we desire it to be understood that we claim, as secured unto us in the above in part recited letters patent, dissolving hair, horn, hoof, wool, or other substances, chemically similar, by means of liquids containing sulphuret of calcium, sulphuret of sodium, or analogous salts, for the purpose above described and set forth.

According to our provisional specification, another part of our invention consisted in the use for manure of the aforesaid dissolving agents, containing sulphuret of calcium and sulphuret of sodium, or analogous salt, or any diluted solution thereof, but since the filing of the same we have found that it is not new, and lay no claim thereto.—In witness, &c.

THOMAS SQUIRE.
CHARLES FREDERICK CLAUS.

Specification of the Patent granted to HENRY YOUNG DARRACOTT SCOTT, *of Brompton Barracks, Chatham, in the County of Kent, Captain in the Royal Engineers, for An Improved Mode of Manufacturing Cement.*—Dated April 17, 1856.

To all to whom these presents shall come, &c., &c.—The object of this invention is to prepare from common quick lime a substance which will, when ground to powder and made up with water, set somewhat after the manner of Portland cement, and gradually attain a very great degree of hardness, thus differing essentially in its action from the preparation of lime as ordinarily used.

In carrying out the invention, I take quick lime, prepared by any of the ordinary methods, and introduce it between two perforated and perpendicular brick walls contained in a kiln, which is also furnished with a fire-place, to allow of the lime being raised to the required temperature.

The roof of the kiln is arched, to reverberate the heat through the lime, and the distance between the perforated walls containing it may vary from one to two feet and upwards, according to the size of the kiln. When the lime is raised to a dull or cherry red heat, the firing is raked out, and iron pots containing ignited sulphur are then to be introduced into the kiln, taking care that they are so placed as to be protected from such a heat as would cause very rapid ebullition of the sulphur, and allowing no further access of air than will find its way into the kiln when the flue is shut and the ash-pit and fire door closed.

It is manifest that such a process as this may be carried on in kilns of various forms, and indeed a more equable distribution of the sulphurous acid is obtained when the lime is placed on perforated horizontal floors; the above-described form being used only on account of the greater facility which it offers for charging and discharging. The effect can also be produced on the lime while still in the kiln in which it has been burned, but I have found this method of procedure precarious, from the difficulty apparently of adjusting the temperature, and of producing regularity of action by the sulphurous acid throughout the mass. The lime may be used in lumps of the size of a cocoa nut, more or less, and in a well constructed dry kiln, one pound of sulphur is a fair allowance for each bushel of lime operated on, but the larger the kiln, the more the process should be prolonged.

In a laboratory experiment where a rapid current of sulphurous acid can be passed through a heated glass tube containing the lime, the required change can be effected in a few minutes. When four or five bushels are operated upon in a kiln, as above described, I continue the process for two and a-half hours, and with a kiln containing two yards, or thereabouts, I think it advisable to continue it for six or seven hours, more or less. Limes prepared from argillaceous limestones or chalks give better results than pure lime, but of course where the clay is present in sufficient quantity to yield a cement by ordinary burning simply, nothing would be gained by making use of the above process also.

Having now described my invention of "An Improved Mode of Manufacturing Cement," I wish it to be understood that under the above in part recited letters patent I

claim, subjecting quick lime, in a heated state, to the action of sulphurous acid, for the purpose above set forth.—In witness, &c.

HENRY YOUNG DARRACOTT SCOTT.

Specification of the Patent granted to EMILE CONSTANTIN FRITZ SAUTELET, *of Paris, in the French Empire, Chemist, for An Improved Process of Tanning.*—Dated January 12, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The skin or hide is first freed from the hair in the ordinary manner, and it is then cleansed from grease by means of soap and water, or alcohol or other solvent which does not injure the fibres. A solution of bark, tannin, sumach, catechu, or other tanning material, is then caused to filter or soak through the skin by means of pressure or suction, produced by mechanical or physical means. This filtration is continued from fourteen to forty-eight hours, or for a shorter or longer time, according to the nature and thickness of the skin. The quality of the leather is improved by employing weak solutions and continuing the action from two to fifteen days. A solution of gelatine, or other matter capable of precipitating the tanning material, is then introduced by pressure or suction. This solution and the tanning solution may be introduced repeatedly and alternately. By these operations the skin may be tanned in a very short time. The skin is stretched during the process in a double frame, which confines and clips the edges of the skin, which is sustained by a trellis or open framework. This frame prevents the skin from being forced out and torn away from its attachments by the pressure of the liquid to which it is subjected. The skin thus held and supported is made to form the partition between two vessels or compartments. Into one compartment the soap and water or other cleansing liquid is introduced by a pump or by a pipe from an elevated cistern, and the liquid is thus forced to pass through the skin into the other compartment. The pressure may also be given by a piston, acted on by steam, or by water or other fluid, or by forming

a partial vacuum in the other compartment. Several skins may be fixed in the same apparatus, and traversed successively by the same solution, and several apparatus may be arranged in stages, so as to operate upon a large number of skins at the same time. After acting upon the skins in this manner for three or four hours, or more or less, the cleansing liquid is drawn off, and water is introduced to wash out the cleansing liquid. The water is then drawn off, and the tanning solution is then introduced in a similar manner, and its action is continued for a period varying from a few hours to fifteen days, or more or less, according to the nature and thickness of the skin and the strength of the solution employed. A solution of gelatine, or other similar substance capable of precipitating the tanning material in the interior or pores of the skin, is then introduced in a similar manner. By thus impregnating or nourishing the skin with gelatine, an additional quantity of leather is formed or precipitated in the pores of the skin, and the quality and density of the leather is thus improved. The alternate filtration of the tanning liquid and the solution of gelatine may be repeated several times, if desired. The nourishing of the skin with the solution of gelatine may also be effected by simply immersing the skin in the solution, or by rubbing it into the skin by hand, or by mechanical means. The density or weight of the leather may be still farther increased, if required, by impregnating it with a solution of a salt of baryta, or a salt of lead, or other suitable metallic salt, and with another salt capable of forming an insoluble precipitate with the first salt. Thus, the skin may be impregnated successively with solutions of sulphate of soda and chloride of barium, which decompose each other, and produce an insoluble sulphate of baryta, and also a soluble sulphate of soda, which may be washed out by causing water to traverse or filter through the skin as before.

The accompanying drawing represents an apparatus adapted for carrying out my invention.

Fig. 1 is an elevation; and

Fig. 2 is a horizontal section at the line *a*, *b*, in fig. 1. The same letters refer to similar parts in both figures.

A, is a wooden frame or foundation, carrying two guides or tramways, B, B, in which run the rollers, C, C, which support the frames, D^1 and D. Each of these frames carries two ears or flanges, E, which receive the ends, g, g^1,

of the clamps, K, K[1]. Two skins, G, G, are placed on the two sides of the central frame, D[1], and their edges are secured by the lateral frames, D, D. A metal plate, L, or a piece of caoutchouc or waterproof cloth, or leather, or other suitable material, is placed upon each lateral frame, D, and a frame, M, with cross bars is pressed upon it by means of a screw, I, passing through the clamp, K, or K[1]. The chambers, O and O[1], are thus closed, and the skins, G, G, are thus protected from the external air, and form a chamber, P, into which the cleansing and tanning liquids and the solution of gelatine are introduced, as hereinbefore described. Q, is a three-way cock, having one branch, R, which communicates with the cistern containing the tanning liquid, and another branch, T, which communicates with that containing the solution of gelatine. Another similar cock may be used for introducing the cleansing liquid and the water; or, the same cock may be used, and the cistern may be successively filled with the different liquids. U, is a cock for allowing of the exit or entrance of air when required; and V, is a cock for running out the liquid into the channel, S. This liquid is thus caused to filter through the skins from their internal faces. In order to equalize the effect, the liquid is afterwards passed in the opposite direction through the skin. For this purpose it is sufficient to remove the plate or waterproof diaphragm, L, and substitute a new skin for it, and to fix and inclose this new skin by another plate or diaphragm. The liquid is then introduced into the chamber, O, and thus the second side of the first skin is tanned while the first side of the new skin is tanned. The first skin is then removed, and another new skin is submitted to the operation. By proceeding successively or alternately in this manner the skins are thoroughly and equally tanned.

Having now described the nature of the invention, and in what manner the same is to be performed, I wish it to be understood that I do not claim generally the tanning of skins by causing the liquid to filter or percolate through them.

But what I claim is,—

First, the tanning of hides or skins by exposing them to the filtration or percolation of soap and water, or other cleansing liquid capable of removing the grease without injuring the fibre, and then exposing them to the filtration

or percolation of the tanning liquid, as hereinbefore described;

Second, the tanning of hides or skins by the successive or alternate application of the tanning liquid and a solution of gelatine, as hereinbefore described.

Third, the improved process of tanning by the successive operations of cleansing and tanning by filtration or percolation under pressure, and nourishing with a solution of gelatine, as hereinbefore described.—In witness, &c.

EMILE CONSTANTIN FRITZ SAUTELET.

Specification of the Patent granted to EDMUND ALFRED PONTIFEX, *of the firm of Pontifex and Wood, of Shoe-lane in the City of London, Chemical Manufacturers, for Improvements in the Manufacture of Tartaric and Citric Acids, and Tartrate of Potash and Soda.*—Dated March 12, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in the following process of and apparatus for manufacturing tartaric and citric acids, and tartrate of potash and soda:—

I first separate or filter the liquors from which tartaric and citric acids and tartrate of potash and soda are obtained from so much of the sulphate of lime or baryta, &c., as is not in solution, and from other impurities, by pressure through textile fabrics, or by other suitable means, and then I evaporate in vacuo nearly to concentration, and then if necessary let the concentrated liquors deposit any sulphate of lime or baryta, or other matters that may have previously been held in solution, by the weak acid liquor, and afterwards I complete the concentration to the point of crystallization. After the crystals have been formed, I again melt, and after having decolourized the liquor in the usual way, evaporate in vacuo and crystallize, repeating the operation, if required, until the crystals are sufficiently pure. The melting in the various recrystallizations I also prefer to conduct in the vacuum pan. The apparatus which I employ to carry my invention into effect is as

follows:—A lead or other vessel in which the liquors are to be evaporated or melted is placed within another vessel which is exhausted, whereby the pressure of the atmosphere is relieved both from the inside and outside of the contained vessel, and thus the most convenient material (lead) may be used to contain the liquors; or the lead may be pressed down upon the outer vessel with some pigment or cement between the surfaces so as to expel the air, and the joints so arranged that no air can enter between them; or glass, earthenware, or enamelled iron or other material not affected by acids may be used as the evaporating vessel without the addition of another vessel to sustain the pressure. I employ peculiarly constructed overflow receivers and external condensers. The overflow vessel contains at the bottom a quantity of chalk, milk of lime, or other alkaline or carbonated solution, through which the vapour from the vacuum pan is conducted by means of a pipe terminating in a rose. Above the surface of the milk of lime, or other alkaline or carbonated solution, a priming plate, perforated for the escape of the steam, is fixed in the overflow vessel, to prevent the solution being carried away by the rush of steam through it. The overflow vessel is furnished with suitable cocks and pipes for the supply of fresh or discharge of the spent solution. The object of employing the solution here is to collect the acetic, butyric, sulphurous and other acids, that would otherwise pass over and injure the apparatus. The overflow vessel would also collect any tartaric acid that accidentally might boil over from the vacuum pan. The steam may be condensed by the ordinary injection condenser, but I prefer to use "Edmund Pontifex's patent condenser," not only on account of its economy in air pump power and quantity of condensing water required, but because by means of it the whole of the products of evaporation can the more conveniently be collected, and the escape or loss of tartaric acid be detected.

In order to prevent leakage in the valves and cocks attached to the vacuum pan, caused by the action of the acid on the metal of which such valves and cocks are composed, I use a description of valve or cock the body of which I make of cast-iron or other suitable metal and line it with lead. I make the valve face and disc gland of india-rubber, and secure the spindle from the action of the acid by a covering of lead.

In the drawing hereunto annexed I have represented a sectional elevation of an apparatus constructed as hereinbefore described.

A, is the vacuum pan, which is formed of a cast-iron case, B, and a lining of lead, C; D, is a man-hole; E, a leaden worm for the steam; G, a valve for the admission of steam to the worm, E; and H, a valve for discharging the contents of the vacuum pan. This valve, H, is composed of a spindle, L, carrying the leaden piece, K, which is covered with india-rubber, I. J, is an india-rubber disc or diaphragm; M, a nut and washer; and N, a screw spindle, which is fitted with a handle, by which the valve is worked; O, is a pipe leading from the valve, H; P, P, are pipes for exhausting the space between the cast-iron case, B, and the lead lining, C; Q, Q, is the passage to the overflow receiver, which contains the chalk or milk of lime or other carbonated or alkaline solution at the bottom, through which the vapour from the vacuum pan is conducted by the pipe, Q, which terminates in the rose, R; R^1, is a supply cock and pipe; R^2 and R^3, are draw-off cocks; S, is the perforated priming plate; and S^1 and S^2, are glass gauges. T, the upper portion of the overflow vessel, which may be called a safety vessel, and is connected by a passage, U, with a second safety vessel, V; W, is a valve for cutting off communication between the pan, &c., and the condenser; and X, is a pipe which leads to the condenser and air pump. Although I have only described the valve or cock, H, as fitted to the vacuum pan for emptying the contents thereof, I find it applicable in a modified form to the entire apparatus where valves or cocks are employed, and where the acid comes in contact with them. As hereinbefore described, I sometimes form my vacuum pan of metal or other suitable material, glazed, enamelled, or coated on the interior thereof with some material or composition not liable to be acted upon by the materials I employ. In such case I dispense with the inner vessel or lining of lead.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the evaporating, in vacuo, of the liquors from which tartaric and citric acids and tartrate of potash and soda are obtained, in pans or vessels constructed, fitted, and operating in the manner hereinbefore described.

Second, the general arrangement and combination of apparatus, hereinbefore described, for the manufacture of tartaric and citric acids and tartrate of potash and soda, consisting of a vacuum pan and fittings, a safety or overflow vessel, with priming plate or overflow vessels, condenser, and air pump.

Third, the constructing of vacuum pans, for the purposes of my invention, with a lining or inner vessel of lead, and the exhausting of the air from between the vessel and the lining; also the employment, for the purposes of my invention, of vacuum pans (and of safety or overflow vessels) enamelled or glazed on the inner surfaces thereof; and

Fourth, the constructing of valves or cocks, to be employed in the manufacture of tartaric and citric acids, in the manner hereinbefore described, and represented in the drawings annexed.—In witness, &c.

EDMUND ALFRED PONTIFEX.

Specification of the Patent granted to WILLIAM JAMES CANTELO, *of Southwark, in the County of Surrey, Gentleman, for Improvements in the Preservation of Vegetable Matters.* —Dated April 22, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention relates to a peculiar method of desiccating fruits, esculents, plants, roots, seeds, and other vegetable matters by means of hot water hearths, plates, pipes, and like arrangements.

And for the better understanding of my said improvements, I will now proceed to detail the particulars thereof, reference being had to the drawing hereunto annexed, in which the same letters refer to like parts throughout.

Description of the Drawing.

Fig. 1, is a longitudinal sectional elevation of one form of arrangement in constructing my improved desiccating apparatus.

A, A, is the external wood or other casing; A^1, A^1, A^1, A^1, metal double partitions or shelves, forming hot water plates or hearths; B, B, is a circular and moveable stove, with

funnel, B[1], and slides into an external tube or pipe, *a*, *a*, *a*, *a*, connected water-tight with the metal water bath or cistern, C, D, from which the hot water circulates to the shelves and other parts of the apparatus; and *b*, is the chamber for charcoal or other suitable fuel, or a gas stove, or other convenient means of maintaining a moderate and regulated temperature may be there situated with like effect; C, is an internal cistern or water jacket, extending to *d*, *d*, round the part, *a*, *a*, that receives the stove; it is open at top but closed at bottom; D, is the external or main water bath or cistern extending to *c*, *c*; the connexions, *e*, *e*, *e*, *e*, between the different shelves may be flat or tubular; E, the hot water flow; and F, the return or cool water. It will thus be seen that the heat of the furnace, B, warms the water in the cistern, C, and is thence communicated to the cistern, D, by contact and circulation. Here the heating medium is represented as placed centrally in the apparatus, and the water flowing from the cisterns towards E, E, through the several plates or shelves, A[1], A[1], and connexions, *e*, *e*, downwards to the connecting pipes, F, F, whence it ascends to *c*, and is heated there, and passes on to E, E, these circuits being shown by the arrows. A water cock may be placed at F, for drawing off; and at *f*, may be a thermometer; and G, G, may be reserve or hot chambers. This arrangement forms a convenient portable apparatus, or it may be extended to any suitable size, and may be square, round, or of any other desired form. It is also obvious that the same principle may be applied to a considerable length of shelves or drying hot water plates. I prefer to incline the shelves slightly, as shown in the drawing, to favour circulation.

It will thus be observed that I construct a boiler and furnace in such a manner as to be able to regulate the temperature to any degree of heat, for the purposes required; and that I cause the water from the boiler to be distributed by the arrangement thereof through the hot water apparatus, also by a screw or pump to keep up the circulation and equalize the temperature throughout. Thus, a pump barrel may be immersed in the water cistern, D, and so arranged that at every stroke of the piston the water will be raised above the ordinary level, and by flowing onwards will maintain the requisite circulation. When vegetable matters are spread over the top metal surfaces

thus heated, they lose their moisture at a temperature which does not decompose or otherwise destroy them while they contract, dry, harden, and retain much of their colour. To facilitate this drying process I prefer to arrange the apparatus like a series of shelves, as A^1, A^1, one above another, by which means the drying proceeds by the action both of contact from the shelves on which the matters are lying, and surface heat from the under surface of the upper shelf, except such matters as lie on the topmost shelf.

Having thus fully described my said invention, and one mode of carrying the same into practical operation, I wish it to be understood, that as the same is capable of a variety of modifications, I do not, therefore, restrict myself to any precise dimensions, materials, or situation, or number of the several parts herein described, so long as the principle of my said improvements is substantially maintained;—

And I do declare that what I claim as my invention is, namely, the novel construction of drying apparatus, and the application thereof for effecting the preservation of vegetable matters, as described.—In witness, &c.

WILLIAM JAMES CANTELO.

Specification of the Patent granted to WILLIAM COLES FULLER, *of* 2, *Bucklersbury, Cheapside, in the City of London, India-rubber Spring Manufacturer, for Improvements in Constructing and Adapting India-rubber as Tyres for Wheels.*—Dated April 7, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The nature of the said invention, as hath been before set forth in the provisional specification, left and recorded on application for the said letters patent, consists in this, viz.:—I make the india-rubber tyre by combining cloth, canvas, or other fibrous material and sheet rubber in alternate layers or thicknesses upon a cylinder or cylinders, or annulus or annuli, corresponding in diameter to the size of the wheel; the canvas by this means will prevent the india-rubber from unduly stretching and becoming loose in the groove, as at present.

Also, instead of springing the india-rubber into its place

and fastening with pins, I propose to fix it tightly on to the outer rim or felloe of the wheel by any suitable means, as for instance, by the aid of projecting discs or rims, one or both of which may be moveable when required.

In some cases I also propose to attach the india-rubber to a wide strap or band of canvas, the sides of which canvas will be turned down, and secured by nails, tacks, or otherwise to the felloe.

Having thus far described my said invention, I now proceed further to describe the same, and in what manner it is to be performed, wherein I shall refer to the accompanying drawings by the words, figures, and letters marked thereon, and hereafter set forth, that is to say:—

I employ a combination of canvas or other fibrous material with the india-rubber in such a manner as to prevent the elongation of the material in the direction of its length, and at the same time to preserve a sufficient amount of elasticity on the outer surface. There are different ways in which this is to be accomplished, as hereinafter described. One method is to wind the sheet rubber and canvas in a continuous length upon a drum or cylinder, corresponding to the diameter of the wheel, to the extent of three, four, or more thicknesses, commonly called "plies," until the required substance is obtained, and the material when vulcanized is cut into convenient widths, to suit the width of the wheel. In some cases the last coat or layer of india-rubber may be thicker than the rest, so as to secure a greater amount of elasticity on the surface (see fig. 3). In other cases I prefer to wind the material, viz., the combined canvas and india-rubber, round the surface of the wheel itself, the material being previously cut into strips or tyres of the proper width, and in this state submitted to the process of vulcanization. The advantage of this mode (which is chiefly applicable to wheels of brass, iron, or other metal,) is that the material in the process of curing or vulcanization adheres and becomes firmly attached to the iron or other metal, and requires no other fixing.

Fig. 1, represents a side view of an iron truck wheel with the combined canvas and india-rubber attached thereto. A, A, is the periphery of the wheel; B, B, the combined canvas and india-rubber tyre. (The same letters apply to figs. 2, 3, 4, 5, and 9.)

Fig. 2, represents parts, in full size, of a similar wheel,

in which the india-rubber and canvas are wound, in the manner before described, and vulcanized on to the wheel.

Fig. 3, represents parts of a similar wheel, in which the material is cut into widths after the process of vulcanization, and driven on the wheel sideways with cement.

Figs. 4 and 5, represent part of a truck wheel in full size, in which a groove with projecting rims on each side is provided in the casting, and the india-rubber is vulcanized on, in the manner before described.

In the larger description of wheels made of wood, (such as would be used for invalid chairs or private carriages,) a projecting rim or flange is fixed on each side of the felloe, one or both of such flanges being secured by screws or other suitable means after the india-rubber tyre is driven on. Care must be taken to keep the surface of these flanges sufficiently below the outer surface of the india-rubber, to prevent the flanges coming into contact with the ground, and the edges of the metal must be rounded off to avoid cutting the material.

Fig. 6, represents part of a wheel as above described. A, is the wood felloe, having a joint as usual between every other spoke; B, the india-rubber tyre; C, is a metal plate or flange; these flanges correspond with the joints of the felloes, and are so fixed as that each joint in the metal shall come half way between the joints in the wood felloe; I generally prefer to make these rims or flanges in segments or separate parts from hoop iron, previously rolled to the requisite width and thickness, and bent edgeways while hot on an iron mandril; by this means they are more readily and accurately fitted to the circumference of the wheel, and are less expensive than when forged by hand. In some cases, however, the said segments or flanges may be made of malleable iron, cast in moulds to the required shape. When fixed, the periphery of the wheel, which is first driven tight up, cannot move or become loosened.

Figs. 7 and 8, represent a view in section of the felloe of the wheel, from which it will be seen that the plates, C, C, fit into a shoulder or recess turned out on the face of the wood, and are fixed by means of countersunk screws or rivets. For smaller wheels these flanges may, if preferred, be made in halves or quarters, as most convenient, and one side may be fixed before the india-rubber tyre is

put on, so as to form a shoulder, against which it may be driven up tight.

Another mode in which I occasionally secure the tyres on to the wood felloes is by means of screws or nails at proper intervals, which pass through the substance of the india-rubber tyre into the wood felloe. The heads of such screws or nails (which should be what are generally termed cheese-head) being sunk below the surface of the india-rubber, and taking their hold on the canvas. This method of fixing may sometimes be convenient for repairs, and for adapting a continuous length of the tyre to different sized wheels, the two ends in such cases being neatly spliced, and where the tyre is used in this manner it may be manufactured by the same methods as the ordinary machine belting. Where truck wheels are turned from the solid wood, I prefer to use a continuous length of the canvas and rubber combined, in alternate layers, as before described, the last thickness of canvas being allowed to project from half an inch to an inch on each side. The tyre is then cut into lengths to suit the circumference of the wheel, and secured by nails or screws, and in this case the flanges may be dispensed with.

Figs. 9 and 10, represent the adaptation of my said invention to wheels for obtaining mechanical motion; fig. 9 being a wheel, and fig. 10, a small wheel termed a pinion. The adaptation of the india-rubber tyre will, I consider, be a sufficient substitute in many cases for teeth or cogs, especially where driving at high speeds. The elastic material herein named is commonly known as vulcanized india-rubber, and therefore I have employed that term to include any combination of caoutchouc or elastic gum, which will answer the same purpose.

Having now particularly described the nature of the said invention, and in what manner the same is to be performed, I declare that I do not claim the use of india-rubber tyres generally.

What I do claim as new in the above-described invention is,—

(I.) The particular method or methods of making the tyres of india-rubber and canvas combined, so as to be non-elastic in the direction of their length, and therefore less liable to become displaced in use.

(II.) The different modes of fixing by said projecting

rims or flanges and screws or fasteners in combination with india-rubber and canvas tyres.

(III.) The mode of fixing india-rubber tyres by vulcanizing on to the wheel itself, as hereinbefore described. —In witness, &c.

WILLIAM COLES FULLER.

Specification of the Patent granted to JAMES HOGG, *of South Blacket-place, Publisher, and* JOHN NAPIER, *of East Sciennes-street, Stereotyper, both of Edinburgh, in the County of Edinburgh, for Improvements in Stereotyping.* —Dated April 5, 1856.

To all to whom these presents shall come, &c., &c.— This invention consists of certain improvements in the methods of manufacturing the metallic plates used by letter-press printers, and denominated "stereotype plates," the said improvements having reference to processes by which a matrix is first taken from the types, or other raised or sunk surface, of which a counterpart is desired, and also to the processes by which a metallic copy is taken from the matrix; the substance of which this copy is composed being any convenient alloy of metals, such as is presently in use for the manufacture of types or stereotype platès.

The first part of the invention relates to the formation of the matrices, and is as follows:—Firstly, a thick viscid paste is to be prepared by the intimate admixture, in about equal quantities, of the earthy substances called red ochre and fine whiting, together with a sufficient quantity (also in about equal proportions) of prepared thin glue and starch and wheaten flour made up into a paste, a little alum being included in the latter compound. Of the glue and paste there is to be employed just as much as is necessary when all the components have been properly mixed, to make the compound a stiff paste or magma. A quantity of this paste is then to be spread with a knife or other suitable instrument upon the surface of a piece of stout packing paper, cloth, or other suitable fabric, and having been first spread as evenly as possible, a straight edge of any convenient kind is passed over it, so that the coating of paste may be rendered uniform in thickness. The amount of

paste spread on should be about equal to the thickness of a threepenny piece, as that coin is at present issued from Her Majesty's mint. This combination of paste and packing paper, cloth, or other convenient substance, is now to be allowed to stand under the influence of the atmosphere for about half an hour, until the surface becomes nearly dry. In forming the paste which produces the surface of the matrix, it is to be understood that we do not confine ourselves to the exact ingredients or proportions hereinbefore specified. Various earthy substances in different proportions may be employed, but those mentioned we find preferable. But let it be distinctly understood that the liquid glue and paste are essential ingredients in the composition incorporating the earthy substances it may be found convenient to employ.

The "page" or "form" of which a cast is required to be taken is now to be laid down with the face uppermost, a slight coating of lard or other oil being brushed over them, and the flat matrix laid down upon the face of the types or "form;" that surface upon which the paste or composition has been spread being next the oiled face of the "form." In this condition the whole is to be subjected to slight pressure in a printing-press, or other convenient apparatus, sufficient to press firmly and evenly the matrix into the face of the types upon which it has been laid. A single and very light "soaking" pull at a printing or other convenient press is sufficient for the purpose; or the impression may be taken by the implements known to printers as a "planer and mallet," used in the same way as when "planing over" a form of types. After the impression is obtained, the matrix must not be moved from contact with the "form" until it has been partially dried; and while this is going on, it is necessary to place a weight of some sort upon the back of the matrix. The best way is to place the bottom of the "form" or "page" [where the words "page" or "form" are used, it is to be understood that these phrases include one or more pages or portions of pages of combined types or woodcuts, or any other raised or sunk surfaces, of which a counterpart may be required,] upon a plate of heated metal, keeping at the same time some flat heavy weight upon the back of the matrix. In a short time (varying according to the amount of heat applied) the matrix will have partially dried whilst lying upon the face of the "form," and when withdrawn

therefrom will be found to afford an exact reverse copy of the "form" or "page" operated upon. This is the first method of forming the improved matrix.

The advantages which it presents over the gypsum or plaster of Paris process now in use are, (1,) either high or low "spaces," "quadrats," or "leads" (in the case of combined types) may be used, and thus all "stuccofying" or filling up with plaster the low portions of the "form" to be cast from is avoided; (2,) the matrices are much sooner ready for casting, less time being occupied in the preparation and drying of these; (3,) less "picking" is required, and the types cast from are returned to the compositor in a cleaner state.

The advantages which it presents over the paper process now in use are, (1,) the matrix requires less time for preparation; (2,) from only a slight pressure in any sort of press, or a stroke on a piece of flat wood or metal laid on the back of the matrix, being necessary to produce an impression, injury to the types is avoided, the damage caused by beating in the paper mould with a brush being entirely obviated; (3,) "kerned" or projecting letters are not liable to be broken, as in the process of beating in the matrix.

The second method of forming an improved matrix is as follows:—Pulverised gypsum or plaster of Paris, such as is commonly used in stereotyping, is to be mixed with water in such quantity as will make a mixture of the consistency of thick cream. The "form" or "page" to be operated upon is then to be laid town, and a ledging of any convenient sort, about one-tenth of an inch higher than the "form," so joined at the edges as to retain the liquid plaster on the surface of the types, and at the same time form the thickness of the necessary coating of plaster, is to be placed round the "form." A thin coating of the cream-like mixture of plaster of Paris is then to be poured over the surface of the "form," to a level with the outside ledging; thus leaving a coating of plaster of Paris about one-tenth of an inch above the face of the "form." A small roller is then to be passed over the face of the "form" to expel the air. There is then to be laid down on the top of the said coating, and supported by the ledging which surrounds the "form," so that the surface will just touch the plaster, an iron or other metallic or earthenware plate, from one-fourth to half an inch in thickness, perforated with holes

throughout the whole body of the plate, and grooved on the upper side. Having laid down this plate in such a manner that its under surface shall touch the plaster coating with which the surface of the "form" is covered, we then proceed to pour upon the *upper* surface of the said plate more liquid plaster, made, as before, of a cream-like consistency. The plate being perforated with a series of holes, the plaster runs through all these, and comes into contact with that coating spread upon the surface of the "form." As much plaster is to be run on the upper surface of the plate as will fill up the grooves on the back, when an ordinary straight edge is to be drawn across the top of the plate, so as to remove all surplus plaster, and leave the back of the plate flat. In a short time the plaster will have "set," or solidified, and consequently the matrix formed by the perforated plate and the plaster will be capable of being withdrawn in a solid mass from the face of the "form." That portion of the matrix formed by the portions of plaster lying between the face of the types and the under surface of the plate will be found to present an exact copy in reverse of the "form" operated upon. In order to prepare this matrix for being cast from, it is essential that it be very gradually and carefully dried on a hot plate, or in an oven with a slowly increasing heat, till all moisture has completely evaporated.

A modification of the plate may be used thus:—Instead of perforations in the body of the plate, there are to be placed on its *under side* a series of ⊥ shaped (or other) projections resembling buttons, each button having a neck about one-tenth to one-twentieth of an inch long between its head and the body of the plate. In this case, the ledging round the "form" to be stereotyped must be higher than when the perforated plate is used. This is necessary, in order to admit of the projections sinking into the plaster without coming into contact with the face of the "form." In other respects the mode of operating is the same. The perforated plate, however, is preferred.

The advantages which the method now detailed affords, in preference to a matrix wholly composed of plaster, as at present in use, are as follows:—

(1.) There being only a surface of plaster, with a series of plaster pins or nipples (or collars having round button-shaped projections) on the plate, it follows that there is a much less body of plaster to be dried, and also, by the

said pins or nipples being surrounded on all sides with metal, the matrix when laid upon a hot plate has the heat readily and equally conveyed to all its parts.

(2.) It will afford a much "flatter" stereotype than can at present be obtained from a matrix composed altogether of plaster of Paris. That is to say, the metal or stereotype plate which is taken from the said improved matrix hereinbefore described will be found to have a surface more nearly a true plane. For, in the case of a plate or cast taken from a matrix composed altogether of plaster as at present, it is found that the evaporation of water from the plaster, whilst it is being baked, causes the surface to "warp" very much, and consequently the corresponding stereotype copy partakes of this "warping," as regards the inequality of surface, which inequality is found by practical printers to be a source of much trouble and annoyance in preparing the stereotype plates for working at press or machine; since good workmanship requires the type or plate surface to be as nearly as possible a true plane.

We come now to describe the second part of the invention, being that part which relates to the employment of a matrix, formed according to either of the methods described under the first part, for the production and manufacture of a copy in metal, said copy being the actual stereotype plate.

(1.) We use as a casting box two plates of metal, of which the superficies shall be of any convenient extent, according to the size of the matrix from which a copy is to be taken, and each having also a rectangular flange of five or six inches. To prepare for casting, we first heat in an oven, having a temperature of 450 degrees Fahrenheit, the metal plates, also the gauge necessary to form the required thickness of stereotype plates. Having heated these plates and gauge, we then lay the matrix between the two iron plates, surrounded by the gauge, and bind the whole together by means of any convenient iron cramp. The sides of the matrix are to be allowed slightly to underlap the gauge, in order that the matrix may be held fast. The matrix and the casting box are now ready to receive the fluid metal or alloy which is to be employed to form the actual stereotype plate. This fluid metal or alloy is of the kind ordinarily employed by stereotypers or type-founders. It may either be poured simply into the aperture between the two iron plates when held apart by the gauge, or it may

be poured between the flanges of the two iron plates. In the latter case, a portion of one of the flanges is filed out, in order to let the fluid alloy run down on the face of the matrix. The gauge also must be adapted so as to keep the fluid alloy from escaping from between the iron plates. As much metal is to be poured in as will fill the casting box, which should always be somewhat larger than the matrix to be cast from. This is for the purpose of exerting a pressure on the metal in the casting box, which pressure causes the fluid metal or alloy to run sharply into all the minute cuttings in the surface of the matrix. It is immaterial, as regards the process of casting, whether the matrix to be inserted into the casting box just described be formed according to the first or second method hereinbefore described under the first part of this specification. The only variable detail is as regards the thickness of the gauge which surrounds the matrix, and keeps it fast between the iron plates, while preventing the fluid alloy from escaping before it "sets."

(2.) A modification of the above casting box may be used thus:—A large brick or slab of fine fire-clay or other suitable non-conducting substance, smooth upon the surface, having a thickness equal to four or five inches, and a superficies of any convenient extent, may be substituted for one of the iron plates. It is simply employed as a substitute for the said iron plate. When used it is to be first heated in the same manner as the iron plates. The use of the brick or slab is to prevent the fluid metal or alloy from cooling too quickly after it has passed into the mould of which the said brick forms part. The brick and plate, with the matrix and gauge lying between them, are to be "cramped" together just in the same manner as the two iron plates.

(3.) Another modification of casting box or mould may be formed thus:—The matrix is to be placed at the bottom of an iron pan (called "flat pans" amongst stereotypers, but having rather higher sides), and other matrices (if found convenient) laid upon intermediate iron plates, these being kept apart by gauges running round any three sides of the matrix sufficient to form the thickness of the stereotype plates desired. An iron top or cover of the ordinary sort attached to a "flat pan" is then to be fixed down, and the fluid metal or alloy poured in, just as in the ordinary "flat pan" used at present in stereotyping when not dipped in a

bath of metal or alloy. Or, like the "flat pan" also it may, if convenient, be dipped into a bath of molten alloy. Before inserting the matrices (if formed according to the first method laid down in the first part of this specification) in this form of casting box, they should be carefully coated on the back with a thin coating of the compound which forms the face of the matrix. This keeps them from charring too much when exposed to the hot fluid alloy.

By any of these three methods, after the fluid metal has become sufficiently cool, it will be found that the surface next to the matrix (formed according to either of the methods hereinbefore laid down in this specification) presents an exact fac-simile of the face of the "form," of which the matrix formed a reverse copy. The face of particular letters may be "picked" or remedied in the ordinary manner, the back of the plate being planed, and its edges trimmed and dressed likewise in the ordinary manner to fit it for press.

It is to be distinctly understood, that we do not claim the exclusive right of manufacturing stereotype plates by means of matrices formed of an earthy substance such as whiting or pulverized gypsum or plaster of Paris; neither do we claim as of our invention the application of "flat pans," as they are commonly called, for the purposes of a stereotype "casting box;" but what we do claim as novel and of our invention is,—

Firstly, the placing in immediate contact with the face of the "form" a composition similar to that described under the first head of the first part of this specification, capable of forming a matrix, which, after being subjected to flat pressure [that is, pressure, however exerted, which is distributed equally at the same moment] upon the faces of the "form" or pages of type, or other raised or sunk surfaces to be stereotyped, and then dried in the manner likewise set forth under the first part of this specification, produces a reverse copy of the said "form" or pages of types, or other raised or sunk surface, which it is required to stereotype.

Secondly, the combination and application, as hereinbefore described under the second head of the first part of this specification, of an iron or other metallic or earthenware plate, with gypsum or plaster of Paris, so united as to form a matrix for the purpose of obtaining stereotype plates.

Thirdly, the combinations and applications of iron, and

of iron and brick, termed "casting boxes" or moulds, hereinbefore set forth under the second part of this specification.—In witness, &c.

James Hogg.
John Napier.

Specification of the Patent granted to Samuel Fox, *of Stocks Bridge, in the Parish of Peniston, in the County of York, Wire Manufacturer, for Improvements in Springs for Railway and other Carriages.*—Dated February 13, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in springs for railway and other carriages, and consists of applying corrugated steel plates in constructing springs in place of the flat or tapering plates of steel now used, by which lighter springs may be constructed for supporting a given weight.

And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, is a side view; and

Fig. 2, is a transverse section of a carriage spring constructed according to my invention. *a*, *a*, are the plates of steel, which are superposed one on the other, as in ordinary carriage springs; but in place of being made flat or tapering, as in ordinary springs, they are corrugated, as is shown, by which greater strength is obtained.

What I claim is, the constructing springs of corrugated plates, as herein described.—In witness, &c.

Samuel Fox.

Specification of the Patent granted to WILLIAM MUSCHAMP, *of the Tyne Paper Mill Company, Gateshead, for An Improvement in the Manufacture of Paper in order to render the same Waterproof.*—Dated March 29, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in the manufacture of paper in order to render the same waterproof. For which purpose the paper, after it has been dried, is caused to pass into or be saturated with a solution or preparation of the following substances or matters, soap (by preference good white soap) is dissolved in pure water and boiled, alum is also dissolved in water, and glue and gum arabic are also dissolved in water. These three solutions are mixed together and the paper is passed into or is saturated with such combined solutions. The paper is then pressed between rolls and dried in the ordinary manner.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The preparation or composition I prefer to employ is as follows:—In two gallons of soft water, in a suitable vessel, I dissolve twenty-four ounces of alum. In a separate vessel I dissolve four ounces of soap (by preference white soap) and one ounce of borax, which solution is boiled for about ten minutes. And in another vessel I dissolve, in sufficient water for the purpose, two ounces of gum arabic and six ounces of glue. These three solutions (when the matters therein are dissolved) are then mixed together and placed in a suitable trough, the compound solution being kept slightly warmed when used. The paper, which has been previously dried, or partially so, is continuously conducted into and through such compound solution in the trough, and is gradually drawn out from the same as it becomes thoroughly saturated. The paper as it comes from the solution is pressed between rollers to remove all excess of the solution, and then the paper is dried in the usual manner. The proportions of the materials above mentioned are those which are preferred, but I do not confine myself thereto, as the same may be varied and yet produce a waterproofing effect according to my invention. I would

state that the use of borax is not essential and may be dispensed with, but I prefer to use it.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that what I claim is,—

The saturating dried, or partially dried paper, with a solution of alum, soap, glue, and gum arabic, and thus rendering the same waterproof, as herein described.—In witness, &c.

WILLIAM MUSCHAMP.

Specification of the Patent granted to DUNCAN MORRISON, *of Bordesley Works, Birmingham, for Improvements in the Manufacture of Articles from Malleable Cast Iron.*— Dated June 4, 1856.

To all to whom these presents shall come, &c., &c.— Heretofore numerous articles have been cast in a description of iron known as malleable cast iron, that is to say, iron which after casting may be annealed, as is well understood, and when casting these articles sand moulds have until the present time be employed.

Now my invention consists in the use of metal moulds when casting articles from this description of iron by which the articles may be cast with greater rapidity and with a less expenditure of labour than heretofore.

Having thus stated the nature of my said invention, I will proceed to describe the manner in which the same is performed.

Heretofore in manufacturing articles of what is known as malleable cast iron (that is, iron which can be cast into form and then brought into a soft state by annealing) it has been usual to employ sand moulds. Now according to my invention I make use of moulds of metal, by preference of cast iron, and each mould of two or more parts, according to the nature of the article to be cast therein; I make the parts of each mould to fit accurately together, and the interior surfaces I make very smooth. When using such moulds I either smoke the interior surfaces or I brush the interior surface over with black lead, and I heat such moulds to a low black heat before running in the metal.

By thus employing metal moulds the same may be used again and again, and the articles cast therein will not only be more smooth, but a considerable saving will result in not having to make a new mould for each article to be cast.—In witness, &c.

DUNCAN MORRISON.

Specification of the Patent granted to JOHN HARRIS HEAL, *of* 196, *Tottenham-court-road, in the County of Middlesex, for An Improvement in Hair and Wool Mattresses.* —Dated May 30, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in the manufacture of hair and wool mattresses. For this purpose a comparatively thin mattress is made and tied in the ordinary manner, and on either surface of such thin mattress a further quantity of hair or wool is placed, and the whole is covered with a suitable case, and the mattress is again tied through. By this mode of manufacture the felting together of the hair or wool is prevented, and the mattresses so made will retain their form better than when produced in single cases, as heretofore.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

In producing a mattress of a given thickness, according to my invention, in place of making the same up in the usual manner of one thickness, I first make up a comparatively thin mattress in a suitable case and tie it through at intervals in the ordinary manner. I then apply a second and larger case, and on one or both sides (preferring it to be on both sides) of the thin mattress, I add hair or wool, and I again tie through the second case at intervals, in like manner to that in which mattresses are ordinarily tied, and if desired to again increase the thickness, two or more comparatively thin mattresses may be first made and placed into a case, there being wool or hair introduced between, above, and below such inner mattresses, the whole being then tied through at intervals, in like manner as if there had been no interior divisions or separation of the material. By thus having the required thickness of a mat-

tress divided into several layers of material, each layer being tied and kept separate from the others, the material is prevented felting together into a mass, and such mattresses retain their forms better than mattresses which are each made in a single thickness.—In witness, &c.

JOHN HARRIS HEAL.

Specification of the Patent granted to JOHN CHRISTOPHERS, *of Heavitree, in the County of Devon, formerly a Merchant, for Improvements in Knives and Forks whose Handles are not Metallic.*—Dated June 4, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object such improvements in table knives and forks as shall greatly increase their strength and durability.

The improvements relate only to knives and forks whose handles have a hole drilled or bored into them longitudinally to receive the tang, and the improvements materially prevent the handle from splitting, and at the same time prevent the tang from being loosened from its fixed position in the handle by hot water or other wear-and-tear cause, and also prevent the tang from turning round or twisting in the handle, all which may be accomplished, without the necessity of using resin or cement, by either of the following means, viz.:—

First, by tenoning or fitting the small end (that is the bolster end) of the handle of a knife or fork into a socket or groove, formed in the handle end of the bolster, around the tang, and then fastening the tang to the handle by inserting a pin in a hole drilled crosswise (that is transversely of the longitudinal hole) through the handle and tang at about the middle of the handle.

In order to save labour, the bolster may be of a circular shape, and so may the socket or groove, which for a dinner-knife may be about one-twelfth of an inch deep. Or the bolster may be the usual shape, forming in it a circular or other shaped socket or groove to receive the small end of the handle. The socket or groove may be formed in the bolster by turning, or cutting, or otherwise as may be most desirable.

Second, by fitting the small end of the handle into a metal band or cap, somewhat of the form of an umbrella cap, though sufficiently stout to become a bolster for balance-handled knives and forks, letting the bolster abut against the hole in the small end of the cap, and then fastening the tang to the handle, by inserting a pin in a hole drilled crosswise through the handle and tang at about the middle of the handle.

The concavity in the cap to receive the handle may be of an octagonal, or circular, or other shape, and the hole to receive the tang may be of a circular or such other shape as may prove convenient, and the size of the bolster need not be much larger than the tang.

If the external part of the cap be made circular, its diameter for a balance-handled dinner-knife may be about five-eighths or three-quarters of an inch.

Third, by placing one-half of a very stout ferrule round the small end of the handle, introducing part of the bolster into the other half of the ferrule, and then fastening the tang to the handle, by inserting a pin in a hole drilled crosswise through the handle and tang at about the middle of the handle.

In this case the middle of the ferrule must be sufficiently stout to become a bolster for balance-handled knives and forks, and there must be a slight pitch so as to create a slight shoulder on the bolster, and there may be a similar slight pitch on the small end of the handle.

According to the foregoing description of the first means, the junction of the bolster with the handle is covered by tenoning, and according to the third means the junction is covered by the ferrule, and a portion of both handle and bolster is embraced.

In all cases the pin which secures the tang to the handle may be of white metal, ivory, horn, whalebone, or any suitable material, and it may be preferable for the pin hole to be drilled in the same direction as from the edge to the back of the knife, and for the purpose of keeping the tang more steady in the handle while drilling the pin-hole, some resin or cement can be used if found desirable.

Tangs are sometimes made too short, and they ought always to be longer than half the length of the handles, and to prevent the tangs from becoming rusty and discolouring an ivory handle, they may be smeared with white paint or tallow.

For carving-forks it may be useful to fix a metal ruffle or collar near the bolster, like the ruffle round oyster knives, but as that is an old invention, of course it is not suggested as anything new.

It is to be clearly understood that I make no claim for any of the separate parts, or dimensions, or shapes, or manner of making the same, because they may be varied;

But my claims as my invention are as follows:—

First, with reference to the first means herein mentioned, I claim the combination of a pin with a socketed or grooved bolster, in the manufacture of table knives and forks whose handles are not metallic.

Second, with reference to the second means herein mentioned, I claim the combination of a pin with the described cap or metal band; and

Third, with reference to the third means herein mentioned, I claim the combination of a pin with the particularly described ferrule.—In witness, &c.

JOHN CHRISTOPHERS.

Specification of the Patent granted to PETER WILLIAM BARLOW, *of Great George-street, Westminster, for An Improvement in Seasoning Timber.*—Dated April 18, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in seasoning timber, and consists of causing air to pass through the timber in such manner as to drive out the sap, and when the timber has been impregnated with liquids of a preservative character the air is used to drive out such fluids. The air used may be in the natural or heated state. The arrangement of apparatus for causing air to pass through the timber may be varied; it is, however, preferred to employ compressed air, and to introduce it at one end of a piece of timber, and to drive out the fluid at the other end by the passage of the air through the pores. Or the air may be introduced into a cut or cavity intermediate of the length of the piece of timber, and the fluid be driven out at each end. Or exhausting apparatus may be applied at one end of the timber, and the other end be left open to the atmosphere, so that the air will flow through the timber to the vacuum. In either case the air, passing in a direction

from end to end of the timber, will force out the sap or other liquids, and dry or season the timber on the interior.

Having thus stated the nature of my invention, I will proceed more fully to describe the manner of performing the same.

And I would state that I prefer to use compressed air for the purpose, which may either be at the natural temperature or heated. But I consider it better to commence with the air at the ordinary temperature, in order to express out the sap or fluid before forcing in heated or dried air, but the whole process may be performed with air in the unheated state. I prefer to fix by screws or otherwise at the end of a stick of timber a plate of metal, and either by a ring of vulcanized india-rubber or by other suitable material I pack the edges so that the air forced in between the plate and the end of the stick or piece of timber may not pass in that direction, but be compelled to find its way through the timber. Or in place of using compressed air the space between the plate and the end of the timber may be exhausted by an air pump or otherwise, when the pressure of the external air will cause air to pass through the timber towards the vacuum. Or in place of thus using a plate at the end of the timber, any length of the piece or stick of timber may be enclosed in a strong vessel, one end thereof being open to the outer atmosphere, the parts where the timber passes through the vessel being packed or closed air-tight, when on air being forced into such vessel, or on such vessel being rendered vacuous, the air will force its way through the timber, and the same will drive out the sap and liquid, and the timber will become quickly seasoned. Or, in place of the means above described, a saw cut may be made midway in the length of the timber and be packed at outer parts, and then by forcing air into the space caused by the cut.

I would remark that this process may be also used when preservative liquids have been introduced into timber. And I would also remark that I make no claim to the apparatus or means of preparing the timber for receiving the air, similar means having before been resorted to for impregnating timber with preservative fluids. My invention consists of causing streams of air to pass through timber or wood in order thereby more quickly to season such timber. —In witness, &c.

PETER WILLIAM BARLOW.

Specification of the Patent granted to JAMES BANNEHR, *of Exeter, for An Improvement in Manufacturing or Preparing Paper for, and in Mounting Copies of Written Documents thereon.*—Dated April 3, 1856.

To all to whom these presents shall come, &c., &c.— The object of this invention is to render more generally useful and available the copies of written documents, drawings, and designs, obtained by means of copying presses and other similar contrivances, by providing a prepared paper fit for mounting, and in mounting such copies on either one or both sides thereof, so as to render such mounted copies available as if made on thick paper, instead of on the thin paper at present in use for such purpose.

To accomplish the above object I impregnate or coat both sides of ordinary paper by means of a brush or other suitable means, with mucilaginous or adhesive matter, consisting of either equal or indefinite proportions of gum acacia or dextrine, and of gum tragacanth, or any other gum or adhesive matter which possesses its adhesive character at an ordinary temperature; but I prefer a mixture of about equal quantities of gum acacia and tragacanth, or of British gum (called "Dextrine") and gum tragacanth. Such prepared or coated paper being dried is then fit for mounting upon in the manner next to be described.

I procure a copy or copies of written documents, drawings, or designs, (done with the usual copying ink) by means of the ordinary copying press on the ordinary thin copying paper, and whilst the paper containing such copies is still damp I place them on the prepared or coated paper, and then on the reverse side of the prepared or coated paper I place similar plain damped copying paper. I then cover the outside of the two pieces of copying paper with two pieces of dry oiled paper, or with two tinned or other metallic plates, and after placing the whole between two cardboard, or other proper pads, or leaves of a book, I give the whole a tight pressure in a suitable press, when the three thicknesses of paper will become united as if consisting of only one thickness of paper. Should it be desired to have the reverse side of the prepared or coated paper covered by written matter, instead of being covered by plain paper, it would be merely

necessary to cover the reverse side with further written matter, in the same manner as the first side, instead of using plain paper. Or if it be desired to use the reverse side for mounting upon, subsequently to mounting a copy on the first side thereof, such reverse side may remain uncovered until such second operation.

My reason for preparing both sides of the mounting paper with adhesive matter is, because if it were to be coated on one side only it would have a tendency to curl in consequence of the shrinkage whilst drying, which objection would be increased by the subsequent application of damp paper. Should the mounting of copies be deferred until so much of the moisture has evaporated as to prevent the copies from adhering to the prepared or coated paper the copies may be made to adhere, either by damping them afresh, or by covering the outside or reading side of the copies with damped paper, the moisture from which would be absorbed by the copies and thus render them capable of adhering to the prepared paper.

Should it be desired to have the copies rendered fit for writing upon, this may be accomplished by sizing the mounted copies with ordinary paper size, or any other suitable size. Or they may be rendered fit for writing upon by pouncing the face of the writing with powdered gum sandarach, or other powdered gum resin, and afterwards pressing the same. The novelty of my invention consists in preparing or coating both sides of ordinary paper with adhesive matter in the manner before described, and after such adhesive matter is dry, in causing copies of recently written documents, drawings, or designs, produced by means of the ordinary copying press, or other similar contrivance, to be pressed on and to be made to adhere to one or both sides of such prepared or coated paper in the manner before described, to the intent that copies mounted on such prepared or coated paper may be made available as thick paper copies.

I therefore claim the preparing or coating such prepared or coated paper, whether by the means before described, or by any other means, and afterwards the mounting copies of written documents, drawings, or designs, on such prepared or coated paper for the purpose of producing fac-simile copies of written documents, drawings, and designs, on paper of the ordinary or any thickness that may be re-

quired thicker than the present paper ordinarily used for taking fac-simile copies of written documents.—In witness, &c.

James Bannehr.

Specification of the Patent granted to Isaac Abraham Boss, *of Bury-street, in the City of London, for Improvements in Preparing Cane in order to Render it Suitable to be Used as a Substitute for Whalebone.*—Dated April 29, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in preparing cane in order to render it suitable to be used as a substitute for whalebone. For which purpose the cane is first cut by being passed between two circular saws, the cane being moved past the saws by two grooved rollers, and it is supported by a grooved bed or guide, on to which it is pressed by a pressing roller. The canes having been properly cut on four sides, they are to be impregnated with a preparation of animal matter, which is obtained as follows:—Bones are steeped in a solution of chloride of lime, the bones having afterwards been dried, are softened by digesting with steam, they are then combined with a solution of alum, and the filtered liquor obtained is employed for impregnating the canes, by placing them in a suitable closed vessel with such fluid, and subjecting the same to a pressure of about twelve atmospheres. After the impregnated canes have been dried in currents of air they are soaked in a solution of alum, and again dried and finished for use.

Having thus stated the nature of the said invention, I will proceed to describe more fully the manner of performing the same.

The canes to be used are first squared by passing them twice between two circular saws, which are set apart and revolve in parallel planes, so as to cut off each time so much of two of the sides of a cane as will reduce it to the size or square required. The canes thus prepared are then to be impregnated with animal matter which is to be rendered insoluble by alum. In preparing the animal matter, or gelatine, it is preferred to be obtained from bones (by

reason of their cheapness), and it is recommended that the bones used should have been first crushed and steeped some hours in a solution of chloride of lime. The gelatine is obtained from such bones in the ordinary and well-known manner, to which no claim is made. This animal matter or gelatine is, when used, diluted with soft water to render it capable of penetrating the cut or squared canes when subjected to any of the ordinary means now well known and employed for impregnating wood with preservative fluids. I prefer to employ a close vessel (such as has heretofore been used for impregnating wood) into which the canes are placed; the vessel is then filled with a solution of animal matter, and the contents are then subjected to a pressure of about twelve atmospheres. It is preferred that the solution of animal matter should, when introduced into the vessel, have mixed with it a solution of such a quantity of alum as will aid in rendering the animal matter insoluble when dried up within the canes, as hereafter explained, but not sufficiently completely to do so without a further application of alum. The canes having been thoroughly impregnated with the solution of animal matter are to be removed from the vessel and dried by subjecting them to currents of air. When well dried the canes are then to be soaked for some hours (five or more) in a solution of alum, by which the animal matter contained in the canes will be rendered insoluble. The canes are again to be well dried, and when dry they are to be finished for use in substitution of whalebone employed in the manufacture of umbrellas, parasols, and other articles.

Having thus described the nature of the said invention, and the manner of performing the same, I would have it understood that I am aware that solutions of animal matter (gelatine) with alum have before been used in woven fabrics to render them waterproof. I do not, therefore, claim to combine such matters, but only to combine such matters with cane in order to render the same suitable to be used as a substitute for whalebone.—In witness, &c.

Isaac Abraham Boss.

Specification of the Patent granted to Abel Desire Schratz, *of St. Denis, near Paris, in the Empire of France, Chemist, for Improvements in Preparing Colours for the Impression of Woven or Textile Fabrics or Stuffs of any Kind.*—Dated April 24, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in making use of linseed for thickening the colours in their preparation for printing textile stuffs or fabrics of any kind. The proportion of linseed to be used, either alone, or mixed with gum arabic, or with artificial gum, starch, and other mucilaginous substances, depends upon the nature of the colours employed; but several applications which I have made of my improved mode of thickening printing colours having proved successful, I will now describe the particular dispositions I have observed in the process for preparing two of them, which may be taken as examples, the practical knowledge of chemists conversant with such operations being sufficient to guide them in all other instances according to the nature of the fabrics or colours. First, printing a rose-coloured pattern on barège fabric: in an ammoniacal cochineal bath, at two and a-quarter degrees of Beaumé's acid scale, pour 1·75 pint of water, heat it to 104 degrees Fahrenheit, add about three ounces of unbruised linseed, heat the whole to 212 degrees, and keep it boiling for about five minutes, then add two ounces of alum, and leave the whole to cool.

On the other hand, in order to obtain a pink or rose hue, dissolve one-third of an ounce of salt for that colour in 0·22 pint of warm water with half an ounce of oxalic acid, and add it to the coloured bath, strain this liquid mixture through a sieve, and it is then in a condition fit for printing.

I should observe, first, that were the same printing bath prepared with gum arabic, three-quarters of a pound at least should have been required, and therefore my process is much more economical. Second, the water added to the cochineal bath is for the purpose of preserving the hue that it should have had, had such a quantity of gum been employed. Third, having remarked that the effect of oxalic acid is to render the colour lighter, I have when using linseed lessened the dose of the former by one-half,

and replaced it in this case, that is to say, for rose hue, by an equivalent quantity of salt. Fourth, in order to avoid the action of the acid on the linseed, which would be destroyed by it, I allow the coloured bath to cool before putting the acid materials into it, which is the reverse of what is done now.

Second Example.—Printing a garnet-coloured pattern on a similar tissue: pour 0·66 pint of water into three and a-half pints of archil, heating it to 104 degrees Fahrenheit, and adding rather less than three ounces of linseed, boil as in the first instance; then taking the liquid away from the fire add to it four and a-half ounces of alum.

With that mixture several colouring baths may be composed, into which, either by adding carmine of indigo, lakes, or extracts of various colours, various tints or hues may be produced, such as carob-tree wood, chesnut, puce, mallows, or violet blossom, and other colours.

I should observe, that if any tin salts or sal ammoniac were to be used in the coloured bath containing the linseed, the tints would fade or become much lighter, and that the colouring matter would fall down, or clots would be produced, according to the quantity of the above materials.

The two modes of application of my improved thickening of colours for printing stuffs by means of linseed, which I have just described, will, I think, be sufficient to guide the competent operator in its application to other colours or hues, for it is impossible to give uniform proportions of the various materials to be employed, since almost each colour requires different proportions, which experience alone can teach; but what I can positively assert is, that there is a considerable saving in the cost price and quantity of the materials used by my process, in baths of the same size when compared with those in which gum is employed. The grounds printed when gum is the thickening material used are generally brittle, and very often crack during the various processes in which the fabric has to be folded, which is not the case when the colour has been thickened with linseed; for the thick or pattern printing colours linseed has not the inconveniences of starch or of gum; in effect these colours are difficult to work with gum, and crack with starch, whilst when thickened with linseed all these objections are avoided. Besides all these advantages, the linseed is yet preferable to several other substances used for thickening, such as *leïocomme dextrine,* baked starch, and

others, linseed being cheaper, more pliable, and colourless, whereas the other substances have a more or less yellow hue, a circumstance of great moment when light or delicate hues have to be printed. The colours thickened with linseed are purer and more vivid than when thickened with starch, because the colour, even when thickened, retains its freshness, and may be preserved for several months without alteration.

When a darker hue is required, the quantity of linseed may be increased and that of the water diminished. In many instances a colouring bath with linseed may be employed, into which its own weight of alum and one-tenth of its weight of tartaric acid may be added. For some colours, blacks for instance, it is necessary to use starch in almost the same proportion as linseed; but as these solutions have a tendency to become acid, they cannot be kept long.

Besides using linseed for thickening colours intended for printing textile fabrics or tissues, my improvements may also be applied for preparing the colours used for printing hanging papers, or any other kind of stuffs.—In witness, &c.

Abel Desire Schratz.

Specification of the Patent granted to Augustus Smith, *of Wentworth-street, in the County of Middlesex, Brush Manufacturer, for Treating Vegetable Fibres in order to fit them for use as a Substitute for Bristles in Paint and other Brushes.*—Dated May 1, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in "flagging" or pointing the ends of vegetable fibres, by rough grinding them on a stone, and then finishing them upon a drum covered with glass, sand, or emery cloth, or paper of various degrees of fineness.

I am aware it has been proposed to use various vegetable fibres for brushes, but on account of the coarse harsh ends of the fibres when cut to form suitable lengths for paint and other brushes they have not been suited for the purposes desired.

Now, I take a bunch of vegetable fibres, either before or

after being made into the form of a brush, and by grinding off the ends to points I obtain a brush as flexible and as suitable in every respect as if made from animal bristles.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim the flagging or pointing of the ends of vegetable fibres in order to fit them for use as a substitute for bristles in paint and other brushes.—In witness, &c.

AUGUSTUS SMITH.

Specification of the Patent granted to RICHARD ARCHIBALD BROOMAN, *of* 166, *Fleet-street, in the City of London, for A Method of Treating Guano and other Matters containing Uric Acid, and the Manufacture from the Products arising from such Treatment, as well as from Uric Acid, of New Colouring Matters, and the Fixing and Application thereof.*—Dated May 6, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention consists,—

Firstly, in the purification of guano and other matters containing uric acid by means of acids, which dissolve all injurious matters and leave the uric acid mixed with insoluble and inoffensive matters. These purified agents are as fitted to be used in the manufacture of the various products arising from the oxidation of uric acid, as uric acid obtained by an expensive process from the same matters by means of alkalies.

Secondly, the invention consists in a new colouring product, which is termed "carmin de pourpre," and in the manufacture thereof, by evaporating solutions of uric acid, or of the purified products obtained, as before stated, in nitric acid or other oxidizing agents.

Thirdly, the invention consists in fixing upon threads, yarns, and fabrics, silk, wool, cotton, and other materials, by dyeing or printing, the above-named "carmin de pourpre," as well as other colouring matters obtained from the oxidation of uric acid, by means of certain metallic salts, such as salts of mercury, of zinc, &c., so as to form in the

threads, yarns, and fabrics metallic purpurates ("purpurates").

And, fourthly, the invention consists in the manufacture of metallic purpurates in a state of lac (laque) or coloured powder, and the application thereof upon paper and fabrics, and to painting.

I now proceed to describe the manner in which the first part of the said invention is carried into effect.

Guano, or other matter containing uric acid, is heated in suitable vessels with muriatic or other acid diluted with water, the action being assisted by heat; the matters are left to settle and the liquor run off; the same acid liquor is passed over fresh portions of the guano (supposing that to be the matter under treatment) till it is completely saturated. The first portion of guano is treated with a fresh supply of acid, then washed with water several successive times, allowed to drain, and then dried. The object of this operation is to dissolve the salts which are formed in the guano, viz., ammoniacal, carbonate and oxalate, calcic, magnesic, and ammoniaco-magnesic phosphates, calcic carbonate, &c., and also to decompose the alkaline urates. The matters thus treated now only contain uric acid combined with sand, calcic sulphate, and other insoluble bodies, and organic detritus (of a yellowish colour), and the substance obtained may be as advantageously employed as uric acid itself in the manufacture of products resulting from the oxidation of this acid. The saturated hydrochloric liquors may be employed either as manure or ammoniacal salts; oxalic acid, &c., may be extracted therefrom. The mode of treatment just described for treating guano is applicable for other matters containing uric acid. Instead of employing muriatic acid, as hereinbefore described, for the purifying of guano or other matters containing uric acid, other acids answering the same purpose may be employed.

To carry the second part of the invention into effect, guano (or other matter containing uric acid), purified as hereinbefore described, is mixed with nitric acid in earthen vessels, portions of guano and acid being placed in the vessels alternately, and a little at a time (in order to avoid the raising of the temperature to too high a degree, and to moderate the effervescence of the liberated nitrous gases). The mixture is left to settle for some days, when a thick pasty substance will result, which is treated with warm

water, filtered, and the residuum washed with warm water; the filtered liquor is of a yellowish or reddish colour; it may be decolourized by animal charcoal, which would retain the matters coloured yellow dissolved by the nitric acid. The liquor, either decolourized or not, is then a solution of uric acid in nitric acid, that is to say, it contains alloxan, alloxantin, urea, and various colourless products, resulting from the oxidation of uric acid. The liquor is next evaporated in any suitable manner in large iron vessels, enamelled or glazed on the inside, care being taken not to raise the liquors to boiling point. The solution is poured into these vessels a little at a time; that already in the vessel should arrive at a pasty consistency before adding a fresh supply, and the matters should be kept stirred all the time. When all the liquid has sufficiently evaporated, the contents of the vessel are left to cool down into a pasty or solid consistency; the product will be more or less solid, in proportion to the extent to which evaporation may have been carried. This pasty or solid substance is of a brownish red or violet colour, sometimes reflecting green rays, and the inventor designates it "carmin de pourpre."

In this operation the colourless products of the oxidation of uric acid being in presence of the ammoniacal salts, urea, ammoniacal nitrate, &c., combined with them in the nitric solution, and undergoing the action of heat, are converted into reddish products, &c. Whatever be the mode adopted for evaporating, care should be taken that the matters should not accumulate in too large a quantity and should not reach boiling point. Instead of employing in the manufacture of this colouring matter guano purified by means of muriatic acid, as previously described, pure or impure uric acid of commerce or other solutions of uric acid may be employed for the purpose, and any other oxidating agent that will answer the purpose may be substituted for the nitric acid employed in the process.

I now proceed to describe the manner of carrying the third part of the invention into effect. In order to apply the colouring matter or "carmin de pourpre" to yarns, threads, and fabrics, and to fix it solidly thereon by means of dyeing and printing, metallic salts are used in such manner as to produce in the fibres insoluble metallic purpurates; the salts which have been found to yield the best results are salts of mercury for red, purple, and pink shades,

and salts of zinc for yellow and buff shades. By these agents this colouring matter may be fixed in dyeing and printing on all descriptions of fibrous or filamentous materials and textile fabrics, whether in a natural state or oiled, as in the case of Turkey reds, whether such materials or fabrics be spun or not, woven or otherwise; also on flocks used for paper hangings or otherwise, feathers, artificial flowers, tanned and tawed skins and hides, employing any means known in dyeing and printing for combining on the fibre, fabric, or article to be dyed or printed a metallic base with a colouring matter. For example, the colouring matter may be applied by steeping or printing, and then fixed by the metallic salts, or the salts may be applied as mordants, and the article dyed with the colouring material; or the colouring material and the metallic salts may be combined in such manner as to produce a wholly or partially soluble preparation, and the fabrics may be then placed in contact therewith; thus, for example, to dye silks in shades of purple, pink, &c., a solution of bichloride of mercury should be mixed with a solution of "carmin de pourpre," and the silk steeped in the combined solution, which it will absorb, and take a fine shade, more or less dark, in proportion to the length of time it remains in the bath, and of the strength of the bath. To dye wools in shades of purple or pink, they should first receive a mordant of a salt of mercury, such as bichloride of mercury, with oxalic acid added, mercurio-potassic, tartrate acid, sulphate of mercury. To these mordants an oxidating agent, such as chloride of lime, chlorine water, and bichloride of tin, &c., should be added, in order to maintain the mercury in a state of peroxide. When the wool has received the mordant and has been washed, it is dyed in a bath of "carmin de pourpre" alone or mixed with salts of alkaline metals, such oxalate of soda, &c. In order to obtain shades of yellow, salts of zinc should be used instead of salts of mercury. For printing cottons, they should first be printed in acetate of mercury and zinc, then dyed in a solution of "carmin de pourpre" and washed; the cotton would be printed in yellow and red, while the ground would remain white.

The method just described for fixing "carmin de pourpre" may also be applied to the fixing on matters to be dyed or printed of pure murexid (purpurate of ammonia), soluble purpurates (purpurate of soda, potassa, &c.,) or any

other colouring matter resulting from the oxidation of uric acid. The same mode may also be adopted for the fixing of the colourless products of the oxidation of uric acids, such as alloxan, or a simple solution of uric acid in nitric acid. On subjecting the dyed fabric to heat, by hot air or otherwise, it will acquire a red shade. In order to fix this colour and obtain fast reds and yellows, the fabric should be passed through a solution of salt of mercury or of zinc. These colouring matters may be satisfactorily applied to the dyeing of fabrics in designs or patterns, as they may be readily eaten away, and designs left in various shades (such as white, yellow, blue, green, gray, &c.,) by means of chemical agents, and these shades readily combine with other known colouring matters, so that the fabric may be doubly dyed, and a variety of plain and figured patterns produced.

I now proceed to describe the manner of carrying the fourth part of the invention into effect. The "carmin de pourpre," murexid, and other colouring matters resulting from the oxidation of uric acid, treated with certain solutions of metallic salts, yield precipitates entirely or nearly insoluble (metallic purpurates), some of which possess much brilliancy. These precipitates, when dry, yield powders or lacs (laques) which might be advantageously employed in painting, and in printing paper hangings and textile fabrics. Thus, the precipitates obtained by means of the acetate and nitrate of mercury, directly combined with the solution of "carmin de pourpre," and other colouring matters resulting from the oxidation of uric acid, and by means of bichloride of mercury mixed first with the aforesaid resulting colouring matters, and then precipitated by means of an alkaline salt, yield purples, violets, and pinks. Those obtained by means of salts of zinc, yield yellow, orange, &c.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the purification of guano and other matters containing uric acid, by means of muriatic or other acids, as hereinbefore described under the first head of this specification.

Second, the manufacture of the new colouring matter, hereinbefore described, called "carmin de pourpre," by the evaporation of solutions of uric acid, or of the purified

products obtained, as described under the first head of this specification, in nitric acid, or other equivalent oxidating agent, all as described under the second head of this specification.

Third, the fixing upon threads, yarns, and fabrics, and textile and fibrous and filamentous materials, and raw and manufactured products, of the above-named "carmin de pourpre," as well as of other colouring matters obtained from the oxidation of uric acid, by means of metallic salts, as described under the third head of this specification.

And, fourth, the manufacture of purpurates in a state of powder and lac, from the combination of "carmin de pourpre," or other colouring matters, resulting from the oxidation of uric acid, with metallic salts, as described under the fourth head of this specification, and also the application of such lacs and powders to purposes of painting and printing paper hangings and fabrics.—In witness, &c.

RICHARD ARCHIBALD BROOMAN.

Specification of the Patent granted to LOUIS JEAN BAPTISTE MANEVY, *of Paris, in the Empire of France, for Certain Improvements in the Manufacture of Cast Steel.*—Dated April 30, 1856.

To all to whom these presents shall come, &c., &c.—My invention refers to the manufacture of cast steel (of every description) by decarbonizing melted cast iron in closed vessels, which decarbonization I effect by the admixture in such closed vessels of pure oxides of iron alone, or it may be with the further addition of wrought iron, lime, and potash or soda.

The oxides of iron and wrought iron itself act as the decarbonizing agents, while the oxides of calcium, potassium, and sodium take up the sulphur, phosphorus, and silicium, and form sulphurets, phosphorets, and silicates.

The method pursued heretofore for obtaining cast steel has been by the process of cementation, for which purpose hard strong iron is used, and such as results from spathic or magnetic iron ores. These ores, after having been

crushed or broken into small pieces, are subjected to the process of cementation, and it has been usual to sort the said pieces, so as to yield various descriptions of cast steel, according to the various degrees of cementation to which the pieces have been subjected.

In pursuance of my invention, and in order to obtain the various sorts of cast steel, I employ, first, white cast iron mixed with malleable iron; or, in the second place, white cast iron alone, which constitutes two very distinct methods.

For obtaining fine steel, which requires to be especially hard and tough, being intended for the manufacture of the most delicate tools, I employ, first, the best white cast iron from Savoy, or from the department of Isère, or any other country affording such products; secondly, I employ the best Swedish iron, or other malleable iron of the best quality. I put into an ordinary crucible, of a capacity to hold about forty pounds of metal, from forty to fifty parts of cast iron and forty to fifty parts of malleable iron, the whole of which is previously reduced into small pieces, together with a porportion of oxide of iron, varying from two to five per cent. The addition of oxides of calcium, potassium, and sodium is only made to impure cast iron, the quantity used of which is varied, according to the impurity of the iron. The several proportions above stated are varied, according to the description or quality of steel it is desired to obtain. The crucible being charged and placed in the furnace, the operation is proceeded with exactly as in melting steel produced by cementation.

As regards the other method of obtaining cast steel in closed vessels with cast iron alone, I proceed by two operations, the one preparatory and the other definitive. The first, which is preparatory, is similar to the method already described, and according to which I use cast iron plates of about three-fourths of an inch in thickness by eighteen inches long and about one foot wide. The upper surface of these plates are divided into small squares by indented cross lines, so that the separation and the fusion in closed vessels may be easier. I subject these plates to a brisk heat in a reverberatory furnace, the body of which is completely sheltered from the action of air. I add to these plates a quantity of pulverized chalk (carbonate of lime), either separately, or together with bone ashes, for the pur-

pose of obtaining a first degree of decarbonization without reducing the weight of the metal. The addition of oxides of calcium, potassium, and sodium I make only to impure cast iron, the quantity used being varied according to its impurity.

The plates are allowed to cool naturally to a certain degree, and are thrown into a trough of water to harden them, in order to facilitate the separation of the squares. The metal is afterwards cast and smelted in crucibles, according to the method and processes above described, that is to say, with an additional mixture of oxide of iron, the quantity of which is varied according to the quality of steel it is desired to obtain.

Having thus described the nature of my invention, and the manner in which the same is or may be carried into effect, I wish it to be distinctly understood that I do not confine myself to the precise details herein described of the proportional quantities of oxides and other substances, as such may be varied or modified without departing from the nature of my invention;—

But what I claim as new, and therefore to be secured to me by the hereinbefore in part recited letters patent is, the manufacturing cast steel by decarbonizing fluid cast iron in closed vessels, which decarbonization is effected by the addition thereto of a certain quantity of pure oxide of iron with or without a proportion of malleable iron, and also, when required, with an additional quantity of lime, potash, or soda, substantially, as hereinbefore described.—In witness, &c.

LOUIS JEAN BAPTISTE MANEVY.

Specification of the Patent granted to WILLIAM DENNY RUCK, *of Topping's-wharf, Tooley-street, for An Improvement in Tanning Hides and Skins.*—Dated April 28, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in tanning hides and skins. For this purpose the hides and skins having been properly prepared as usual, are, in place of being submitted to the process of tanning heretofore prac-

tised, to be placed in a closed vessel, from which the air is to be exhausted, the tanning liquor run in, and subjected to pressure; a portion of the liquor is from time to time to be withdrawn, and fresh liquor is to be introduced.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The skin or hide being first limed and prepared for tanning, as now adopted by the tanners, is to be placed in a vessel of any size or shape capable of being made air-tight, and of containing any required number of hides, and of sufficient strength to bear a pressure of from fifty to eighty pounds on the square inch, the hides being placed in this vessel, and the same being made air-tight, the air is to be extracted by means of an air-pump; and when a vacuum is obtained, the vessel is allowed to fill itself with tan liquor made in the usual way (and I prefer it to be used warm) by means of a pipe with a cock in it, having communication with a reservoir filled with the tan liquor; when no more liquor will run in a force pump is to be used to force in as much liquor as possible, it is then to remain for a few hours, after which a tap at the bottom of the vessel is turned partly on, and some liquor allowed gradually to escape, and stronger liquor is to be forced in at the same time. This plan is to be continued at intervals of a few hours each for three days, stronger liquor being used each time. The hides will then be turned into leather, which is to be dressed and finished in the usual way.—In witness, &c.

William Denny Ruck.

Specification of the Patent granted to William Tytherleigh, *of Birmingham, in the County of Warwick, Accountant Clerk, for A New or Improved Method of Coating or Covering Iron, or Articles of Iron, with Copper, or Alloys of Copper.*—Dated April 18, 1856.

To all to whom these presents shall come, &c., &c.—My said invention consists of the method or methods,

hereinafter particularly described, of coating or covering iron or articles of iron with copper, brass, or other alloy of copper, that is to say, of coating or covering iron in sheets or bars, or before it is manufactured into articles, and also coating iron after it has been made into articles with copper, brass, or other alloy of copper.

In carrying my invention into effect, I first clean the surface of the iron from scale, rust, or other adhering matter. This I effect by steeping the iron or articles in dilute sulphuric or hydrochloric acid, or by treating the said iron or articles with such other liquids as may be proper to dissolve or remove the foreign matter which may be attached to the surface; or I anneal or heat the iron or articles of iron so as to form a scale thereon, the detaching of which scale leaves the surface of the iron clean. But I do not limit myself to any methods of cleaning the iron or articles, as any of the well-known processes of cleaning iron may be resorted to in carrying my invention into effect. I take a pan, vessel, or crucible, made of iron, fire-clay, or other material capable of bearing the heat to which it will be exposed; I fuse in the said vessel or pan, copper, or brass, or other alloy of copper, and I add borax or other flux to the fused metal; I put the cleaned iron or articles into the said pan or crucible, and by shaking the said pan or crucible cause the said iron or articles to be uniformly heated and coated with the copper or alloy, the said copper or alloy attaching itself to the said iron or articles as soon as they acquire a certain temperature. If the pieces of iron or articles to be coated are too large to permit of the shaking of the pan or crucible, then the said pan or crucible is allowed to remain stationary in the fire or furnace, and the iron or articles are moved about in the fused metal contained in the pan by means of a pair of tongs or other implement. I sometimes fuse the copper or alloy with borax or other flux before putting the iron or articles in the pan; and I sometimes pursue a contrary course with the same or nearly the same effect, that is to say, the iron or articles may be first placed in the pan and heated before the copper or alloy is put into the said pan. The copper or alloy may either be put in the pan in lumps or granulated. When the coated articles are removed from the pan I put them into a sieve, if they are small, and shake them until the coating on them has solidified; or I place them on

a plate of iron or other smooth surface, and stir them until they have cooled sufficiently to prevent them adhering to one another. When the pieces of iron or articles are large I place them separate to cool on any convenient support. In some cases, especially where the iron or article is massive, I heat the said iron or articles before putting them into the fused copper or alloy.

My invention is applicable to the coating of articles of wrought iron, cast iron, and the annealed cast iron, commonly called "malleable iron," as well as to the coating of sheets and bars of such kinds of iron as can afterwards be manufactured into articles without fusion, the said coated sheets and bars being afterwards used for manufacturing purposes.

Having now described the nature of my said invention, and the manner of carrying the same into effect, I wish it to be understood that I do not limit myself to the precise details herein described, as the same may be varied without departing from the nature of my said invention; but I claim as my invention the new or improved method herein described of coating or covering iron, or articles of iron, with copper or alloys of copper, that is to say, coating or covering iron, or articles of iron, by immersing and agitating the said iron or articles in fused copper or alloy of copper, or by putting the said copper or alloy on the iron or article to be coated and submitting the whole to a suitable heat until the copper or alloy has fused thereon, a suitable flux being employed in either case.—In witness, &c.

WILLIAM TYTHERLEIGH.

Specification of the Patent granted to ALFRED VINCENT NEWTON, *of* 66, *Chancery-lane, in the County of Middlesex, Mechanical Draughtsman, for A New Method of Obtaining Purified Oil from Coal, Shale, and other Bituminous Substances.*—Dated April 22, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention, as communicated to me by my foreign correspondent, relates to a new or improved method of dis-

tilling coal, shale, and other bituminous substances, whereby a pure oil suitable for illumination and other purposes is obtainable at the first distillation.

It has long been known that many varieties of coal, shale, and bituminous substances were capable of affording oil and oily matters when subjected to dry distillation at a low temperature, but in general the oil obtained at the first distillation comes over in a crude coarse condition, totally unfit for use. Several processes have been invented for purifying this crude oil, and some of them are attended with great success, but nearly all of them are expensive. They involve the use of large quantities of sulphuric and other acids, salts, repeated distillations, heatings, boilings, agitations, decantations, and other labours. The bituminous substances before referred to yield, on distillation at a low temperature, a gas which if passed through a worm or other suitable refrigerator condenses into what is known as crude oil, requiring purification, as described.

The present invention consists in straining the gas which produces the oil by passing it through a stratum or strata of sand or other suitable medium, so that when condensed it forms a clear and valuable oil ready for immediate use. This result is obtained by the following process, viz.:—The coal, shale, or whatever bituminous substance is to be distilled is broken up into very small pieces, and deposited upon the bottom of the retort. Upon the coal is thrown a quantity of common sand, about four times greater in weight than the weight of coal. The sand should be made to cover the coal evenly, so that the gas in escaping from the coal will pass through the sand. A condensing tube leads from the upper part of the retort to the refrigerating worm. The retort, thus prepared, is submitted to a low fire, the heat of which is very gradually and carefully increased until the coal and sand having reached a temperature of about 212 degrees Fahrenheit, the moisture contained in the coal and sand begins to rise into the condensing tube in the form of steam, and on passing into the worm is condensed into water and escapes; the water, thus brought over, is loaded with black carbonaceous impurities. The same temperature being continued, the condensed water gradually becomes clearer, and the oil begins to form; both oil and water escaping together from the worm, the oil rising to the surface in the receiving vessel. The oil as it

thus exudes is beautifully clear and pure, and when burned in an argand lamp with a deflecting button over the wick gives a most brilliant light, totally free from smoke. As the distillation proceeds the quantity of water that comes over lessens. The temperature before named should be steadily maintained until no more pure oil is produced. With some varieties of bituminous substances, however, the oil ceases to come over before it has all been exhausted from the material, although exposed to the above heat for a time, as described. In such cases a higher temperature is then required. Such additional heat should be applied very gradually, and with the utmost care. The distillation may proceed, adding degree of heat by degree, so long as the distilled substance yields pure oil. When the heat has passed a certain point, which is determined by the nature of the substance under distillation, no more pure oil can be had, and crude, oily, and tarry matter comes over. If on commencing the distillation, or during any of its stages, the heat be too suddenly or too greatly raised, the pure oil will cease to flow, and the thick oil or crude oily matter and tar will come over. It will also be found that a slight change of temperature produces a change in the colour of the oil. The lower the temperature that can be maintained, the lighter in general will be the colour of the product. Owing to the great variety of bituminous substances existing it is impossible to lay down the exact degree of heat required for the distillation of each by the process, but as a general rule the following method should be observed:—Commence with a low temperature and carry it up very gradually until the pure oil begins to condense, continue the same temperature so long as the oil exudes; if the oil ceases, increase the heat very gradually, as before described, until no more pure oil can be obtained. The gas out of which the oil is formed should be set free, and have an opportunity of passing slowly through the filtering or straining substances, so as to deposit its impurities. When too much heat is applied the filtering or straining operation will be imperfectly acomplished. If preferred, the sand or other filtering substance, instead of being mixed directly with the coal, may be separated from it by a diaphragm or by being placed in a separate heated vessel; so long as the gas is thoroughly strained, whether it is done in either of the modes mentioned, the oil when condensed will be

purified. Instead of using sand as the straining or filtering medium for the gas, clay and earths of most kinds may be employed, as also chalk, gypsum, lime, black oxide of manganese, some salts, plumbago, charcoal, &c. These may be used separately or in combination, but they are not all equally suitable for the various kind of bituminous substance, as some of them will improve the colour and quality of the oil, probably by chemical action. The filtering substances may have chemicals mixed with them for the purpose of changing or removing the odour of the oil or for increasing its purification, if desired. When it is needed to refine the oil beyond the purity of the first distillation, the oil may be re-distilled in the hereinbefore described manner until the desired quality is obtained. The same process is applicable to the purification of nearly all kinds of oils. In every case care should be taken to cause the gas out of which the oil is made to be thoroughly strained. The quantity of sand or other material needed for straining the gas may be varied to suit circumstances. Where a larger proportion of the filtering material is used than that herein named the oil will generally tend to be clearer. The nature of the substance to be distilled must regulate the quantity and formation of the straining media.

The coke remaining after distillation will be found valuable as a fuel, and the filtering sand or earths, becoming charged as they do to some extent with ammoniacal products, may be employed with advantage for agricultural purposes. Some of these products when mixed with sulphur will harden on exposure to the atmosphere, and may be used for roofing, forming artificial stone, &c.

Having now described the invention of "A new Method of Obtaining Purified Oil from Coal, Shale, and other Bituminous Substances," as communicated to me from abroad, I wish it to be understood that under the above in part recited letters patent I claim, passing the gas which produces the oil through a stratum or strata of sand or other suitable substance or substances that will produce an analogous result, for the purpose of straining or filtering the gas, and obtaining a pure oil, substantially as described. —In witness, &c.

ALFRED VINCENT NEWTON.

Specification of the Patent granted to Hiram Hyde, *of Truro, Nova Scotia, Gentleman, for An Improved Manufacture of Lubricating Compound.*—Dated November 27, 1855.—(A communication.)

To all to whom these presents shall come, &c., &c.—To express clearly the nature of the present improvement, it is necessary that I should describe some discoveries made in the course of extended experiments on coup oil used as a lubricator. It has been found that this oil, and the lubricating oils made from the products of the distillation of cannel coals, bitumens, bituminous shales, and petroleums or naphthas, at temperatures above 600 degrees Fahrenheit, when used on rapid running machinery, have a certain moderate degree of durability, and those distilled at a lower temperature still less, and that the resistance to wear is increased by mixing with these oils other kinds of oil, such as castor, sperm, lard, rape, or whale oil. When such mixtures are exposed in small quantities to high heat (say, over 212 degrees Fahrenheit,) or to the sun's rays several days a change is observable, commencing at the surface of each in a shorter or longer time; and this influence of high heat or the sun's rays in changing any oil, from whatever source, is a very useful indicator of the durability and lubricating power of the oil. As the oils considered the best lubricators known are those prepared from the hydrocarbons of coals, bitumens, and naphthas having high boiling points (often as high as 800 degrees Fahrenheit), prepared by the process for which I have obtained Her Majesty's royal letters patent, the inventors of that process have been led to make use of solid hydrocarbons in improving them. After learning by trials the specific action of common oils, stearine of fats, spermaceti, and wax, an oil was easily manufactured from the coup oil by mixing it with lard and other common oils, which is quite as valuable as a lubricator as sperm oil. But further experiments having induced the rejection of the scaly and brilliant hydrocarbons as additions, it was demonstrated, by trials of several months' duration, that the addition of even a very minute portion of the solid hydrocarbons, such as elastic bitumen, caoutchouc of Para and India, and the mixtures of caoutchouc called African rubber, to

purify coup oil (known in the American market as Messieurs Atwood's coup oil), and other hydrocarbon oils, exerts a most remarkable action in giving permanence to them, either alone or when mixed with other oils, and at the same time improves the lubricating or truly oily character of the oil, and the changes under the influence of high heats or the sun's rays are in like manner retarded or prevented for a long time, so as to give a degree of permanency and lubrication, such as no other known oil or mixture possesses when tested by lubrication indicators. This action of the elastic hydrocarbons is referable to the power which a minute quantity added has in modifying the qualities of a body recognized in other cases, such as in alloys, where arsenic or phosphorus injure metals. In strict accordance with this view, it is found that when the elastic hydrocarbon exceeds two per cent. of the weight of the coup oil the valuable qualities are in every case impaired, and that even less than one per cent. is usually all that need be combined by chemical solution with the coup oil or other hydrocarbon oils. In practice, it will suffice to use from one-fourth of one per cent. to five-eighths of one per cent. of the elastic hydrocarbons for the coup oil made by the Messieurs Atwood's process, and it is found that one-half of one per cent. will give durability and lubrication much beyond that of sperm oil.

To enable those skilled in the art to manufacture the improved lubricating compound, I will now describe the process for preparing it to resist wear on heavy as well as light and rapid machines. To every hundred gallons of coup oil, whether mixed with other oils or not so mixed, in the state in which it is found in the market, seven pounds of elastic bitumen, Para or East India caoutchouc, or African rubber are added, the same being first inclosed in a sieve cloth bag, and then suspended in the oil, which may be at any temperature varying from eighty to one hundred and fifty degrees Fahrenheit. By agitating the whole from time to time, and applying pressure to the sieve cloth, all the pure part of the added hydrocarbon is dissolved and combined with the oil. The bag is then removed and the mixture is passed by means of a pump through a fine wire gauze sieve into another vessel, where it is permitted to rest until it becomes perfectly brilliant, and it is then fit for use.

I do not confine myself strictly to the proportions

above stated, but for delicate bearings I propose to use less of the hydrocarbon, one-tenth of one per cent. producing a markedly good effect when tested by the dynameter. I am aware that caoutchouc, as expanded by spirits of turpentine, has been used in mixture with carbonate of soda, glue, and common animal and vegetable oils for lubricating. When such a mixture is used, the turpentine evaporates readily and leaves the caoutchouc in filaments on the surface, as it has not been dissolved, nor is any solvent of it present. I, however, reject all such mixtures, and limit myself to the use of that small amount of the elastic bitumens which coup oil will dissolve perfectly, not exceeding four per cent., and using the fixed coup oil as a direct solvent.

Having now set forth the nature of the invention of "An Improved Manufacture of Lubricating Compound," as communicated to me by my foreign correspondent, and described the manner of carrying the same into effect, I wish it to be understood that under the above in part recited letters patent I claim the addition of elastic hydrocarbons, such as mineral and vegetable caoutchouc, to coup oil, or other pyrogenic hydrocarbon oil, either alone or mixed with other oils, for the purpose above explained. —In witness, &c.

HIRAM HYDE.

PATENTS SEALED TO DECEMBER 24, 1856.

November 28, 1856.

1283. FREDERICK LUKE STOTT, of Rochdale, THOMAS BELWARD and JAMES FINDLOW, of Manchester, for machinery or apparatus for washing wool or garments, and other articles made of textile fabrics. —Dated May 30, 1856.

1299. GUSTAVUS GIDLEY, of Hoxton, and WILLIAM CHRISTOPHER, of Pinner, Middlesex, for reducing the bottle or imported india-rubber to a transparent liquid state, so that it may be used as a transparent varnish or solution for mixing with colours.—Dated June 2, 1856.

1301. BENNETT JOHNS HEYWOOD, of Leicester-square, for a holder for leads and other marking materials.—Dated June 2, 1856.

1305. VICTOR JEAN BAPTISTE MAUBAN, of Paris, and South-street, Finsbury, for cans for holding oil and other liquids.—Dated June 2, 1856.

1330. Edward Hatton, of Birmingham, for plain and ornamental metallic tubes.—Dated June 4, 1856.

1331. Duncan Morrison, of Birmingham, for metallic bedsteads and other articles to sit or recline on.—Dated June 4, 1856.

1333. Duncan Morrison, of Birmingham, for articles from malleable cast iron.—Dated June 4, 1856.

1349. James Somerville, of Glasgow, for weaving.—Dated June 6, 1856.

1380. Armand Eugene Preux, of Paris, for warming railway and other vehicles.—Dated June 10, 1856.

1386. John Henry Johnson, of Lincoln's-inn-fields, for the manufacture of safety paper.—Dated June 11, 1856.—(A communication.)

1438. Charles Clifford, of the Temple, for boat lashings, and in blocks and apparatus used for raising and lowering boats and other articles.—Dated June 18, 1856.

1489. Charles Durand Gardissal, of Bedford-street, Strand, and Paris, for engraving glass and crystals.—Dated June 25, 1855.—(A communication.)

1515. John Henry Johnson, of Lincoln's-inn-fields, for the production of carbonate of barytes.—Dated June 27, 1856.—(A communication.)

1550. Joseph Henry Van Hengel, of Anvers, Belgium, and of South-street, London, for apparatus for raising and lowering bodies in mines.—Dated July 2, 1856.

1658. Jean Louis Lucas and Albert de Briges, of Paris, for preparing certain liquid or solid alimentary substances from the husk of a certain fruit.—Dated July 15, 1856.

1973. James Wadsworth, of Hazelgrove, near Stockport, for the ventilation of mines, and in removing noxious gases or vapours from places in which they accumulate or are generated, and in machinery or apparatus applicable to, and to be used for such purposes.—Dated August 23, 1856.

2120. William Henry Forster, of Gravesend, for a fastening for articles of jewellery, brooches, or dress ornaments.—Dated September 10, 1856.

2134. John Talbot Pitman, of Gracechurch-street, for repeating fire-arms.—Dated September 12, 1856.—(A communication.)

2161. Alfred Vincent Newton, of Chancery-lane, for the preparation of phosphoric acid.—Dated September 16, 1856.—(A communication.)

2184. Thomas Callender Hinde, of Birmingham, for the manufacture of iron.—Dated September 18, 1856.

2223. John Morrison, of Birmingham, for a new or improved pen-holder.—Dated September 22, 1856.

2249. Arthur Albright, of Edgbaston, for the manufacture of lucifer matches, and of boxes suitable for containing the same.—Dated September 25, 1856.

December 2, 1856.

1303. Auguste Cadet, of Camden-town, for stamp inking apparatus.—Dated June 2, 1856.—(A communication.)

1314. George Josiah Mackelcan, of Islington, for the manufac-

ture of rollers adapted to calico and other printing.—Dated June 3, 1856.

1315. EDWIN HEYWOOD, of Sutton, Leeds, and THOMAS OGDEN DIXON, of Steeton, near Keighley, for the means of attaching drawer and other knobs or handles.—Dated June 3, 1856.

1334. JOHN CHRISTOPHERS, of Heavitree, for knives and forks whose handles are not metallic.—Dated June 4, 1856.

1341. ANDREW EDMUND BRAE, of Leeds, for apparatus for communicating signals from one part of a railway train to another.—Dated June 5, 1856.

1360. SAMUEL DYER, of Bristol, for reefing, furling, and setting the sails of ships and vessels, also for protecting such sails from wet and other abuses caused by ropes and rigging.—Dated June 7, 1856.

1377. CARLO PIETRONI, of London Wall, for printing on cloth and other fabrics.—Dated June 10, 1856.—(A communication.)

1388. ALFRED VINCENT NEWTON, of Chancery-lane, for breech-loading fire-arms.—Dated June 11, 1856.—(A communication.)

1425. HENRY HOLLAND, of Birmingham, for the manufacture of umbrellas and parasols.—Dated June 17, 1856.

1426. JOHN SADLER, JOSIAH GREEN, and THOMAS DAVIS, of Birmingham, for the manufacture of hinges.—Dated June 17, 1856.

1440. CALEB PERRY SHARPLEY, of Stockwell, for paddle-wheels for propelling vessels.—Dated June 18, 1856.

1475. ISAAC ATKIN and MARMADUKE MILLER, of Nottingham, for machinery for sewing lace and other fabrics.—Dated June 23, 1856.

1560. WILLIAM HICKLING BURNETT, of Margaret-street, for electric telegraphs, and in apparatuses employed therein.—Dated July 2, 1856.

1598. HENRY BOLLMANN CONDY, of Battersea, for defecating or purifying acetic acid, and other solutions, also in disinfecting rooms and other places, and in preserving wood.—Dated July 7, 1856.

1608. ALFRED VINCENT NEWTON, of Chancery-lane, for repeating fire-arms.—Dated July 8, 1856.—(A communication.)

1680. CHARLES BARLOW, of Chancery-lane, for a surveying instrument.—Dated July 17, 1856.—(A communication.)

1837. THOMAS BARNABAS DAFT, of Dublin, for the manufacture of cast iron pipes.—Dated August 4, 1856.

2163. ROBERT WALKER, junior, of Glasgow, for ascertaining the draught of water and trim of ships or vessels.—Dated September 16, 1856.

2214. JOHN ROBERTS and JAMES BEECH, of Walsall, for a railway chair.—Dated September 20, 1856.

2251. JOHN JAMES RUSSELL, of Wednesbury, and JOSEPH BENNETT HOWELL, of Sheffield, for the manufacture of cast-steel tubes.—Dated September 25, 1856.

2282. GEORGE TOMLINSON BOUSFIELD, of Brixton, for the manufacture of artificial stone.—Dated September 29, 1856.—(A communication.)

2382. TIMOTHY GILBERT, of Massachusetts, for piano-forte action or string sounding mechanism.—Dated October 10, 1856.—(A communication.)

December 5, 1856.

1359. WILLIAM DENNY RUCK, of Toppings Wharf, and VICTOR TOUCHE, of Rathbone-place, Oxford-street, for the manufacture of paper from fibres not hitherto applied to such purpose.—Dated June 7, 1856.

1365. ROBERT FERRIER, of Jedburgh, for machinery or apparatus for sweeping and cleansing roads and streets.—Dated June 9, 1856.

1366. JAMES HOLDIN, of Manchester, for machinery or apparatus for washing rags, which said improvements are also applicable for washing other materials.—Dated June 9, 1856.

1367. JAMES HOLDIN, of Manchester, for machinery or apparatus for bowking, bleaching, dyeing, and washing textile fabrics or materials.—Dated June 9, 1856.

1389. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for the manufacture of spoons, forks, and other similar articles, and in the machinery employed therein.—Dated June 12, 1856.—(A communication.)

1407. HYPOLITTE MEGE, of Paris, for the manufacture of bread. —Dated June 14, 1856.

1411. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of Paris, and South-street, London, for metallic packing for stuffing boxes and pistons.—Dated June 14, 1856.—(A communication.)

1464. CHARLES MINNE and AMAND COLSON, of Brussels, for making bread.—Dated June 21, 1856.

1466. JEAN CHARLES LEFEVRE LACROIX, Merchant, of Heutrégiville, for filthing and shaving the merino, plain satin, and muslin of wool.—Dated June 23, 1856.

1477. EDWIN HARDON and JOSEPH HENRY, of Stockport, for looms for weaving, and in machinery for communicating motion to looms and other machines.—Dated June 24, 1856.

1487. JULES ETIENNE LAFOND, of Belleville, near Paris, and South-street, London, for lighting.—Dated June 24, 1856.

1505. DAVID MACDONALD, of Glasgow, for printing textile fabrics and other surfaces.—Dated June 26, 1856.

1609. ALFRED VINCENT NEWTON, of Chancery-lane, Mechanical Draughtsman, for fountain pen.—Dated July 8, 1856.—(A communication.)

1701. JAMES LAWRENCE CROCKETT, of West Ham, for improvements in evaporating.—Dated July 19, 1856.

1705. JAMES LAWRENCE CROCKETT, of West Ham, for the manufacture of sulphuric acid.—Dated July 19, 1856.

1792. ROBERT THATCHER, of Oldham, for preparing for doubling or spinning cotton or other fibrous substances.—Dated July 29, 1856.

1793. JOHN KNOWLES, of Calow, and WILLIAM BUXTON, of Birmingham, for tuyères.—Dated July 29, 1856.

1913. WILLIAM TRANTER, of Birmingham, for fire-arms.—Dated August 16, 1856.

1923. THOMAS SCOTT, of Glasgow, for cooking.—Dated August 18, 1856.

2229. RICHARD HUSBAND, of Manchester, for the manufacture of silk hats.—Dated September 23, 1856.

2235. JAMES COTTRILL, of Studley, for machinery to supersede hand labour in the operation of filing.—Dated September 24, 1856.

2281. HENRY JENKINS, of Birmingham, for the manufacture of buckles and other dress-fasteners.—Dated September 29, 1856.

2378. FREDERICK ALBERT GATTY, of Accrington, for improvements in dyeing.—Dated October 29, 1856.

December 9, 1856.

1369. JOHN ELLIS, of Heckmondwicke, for muriate of ammonia and carbonate of ammonia, and in converting certain ingredients employed therein into an artificial manure.—Dated June 9, 1856.

1370. BENJAMIN SMITH and WILLIAM KALTHOFF, of Gemünd, for economizing fuel in the locomotive and other steam-engines.——Dated June 9, 1856.

1378. PERCEVAL MOSES PARSONS, of Duke-street, for the permanent way of railways.—Dated June 10, 1856.

1384. WILLIAM HENRY WESTWOOD, THOMAS WRIGHT, and EDWARD WRIGHT, of Dudley, for stop or regulating valve.—Dated June 11, 1856.

1399. WILLIAM MASSEY, of Manchester, for looms for weaving.—Dated June 13, 1856.

1495. ROBERT WILSON CHANDLER, of Bow, and THOMAS OLIVER, of Hatfield, for engines employed for agricultural purposes.—Dated June 25, 1856.

1513. ANDREW SHANKS, Engineer, of Robert-street, for machines for drilling, boring, and cutting metals.—Dated June 27, 1856.

1604. FREDERICK WILLIAM HOFFMAN, of New York, for breech-loading fire-arms.—Dated July 8, 1856.

1606. JULIEN FRANÇOIS BELLEVILLE, of Paris, for generating and applying steam.—Dated July 8, 1856.

1712. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for supplying air to gas and other lights.—Dated July 19, 1856.—(A communication.)

1765. GEORGE SPENCE, of Cannon-street West, London, for couplings of feed-pipes of locomotive steam-engines and tenders.—Dated July 25, 1856.—(A communication.)

1831. THOMAS GREEN, of Leeds, for mowing machinery.—Dated August 2, 1856.

1861. ALEXANDER THEODORE NICOLAS GOLL, of Paris, and South-street, London, for buttons.—Dated August 7, 1856.

2030. ALFRED VINCENT NEWTON, of Chancery-lane, for charger for shot pouches.—Dated September 1, 1856.

2115. STEPHEN WHITE, of Liverpool, for a method and apparatus for the distillation of certain oils or oily substances from the petroleum commonly called earth oil, found in certain districts in the Birman empire, and an improved method of purifying the oils or oily substances so obtained.—Dated September 10, 1856.

2265. DAVID LAW and JOHN INGLIS, of Glasgow, for moulding or shaping metals.—Dated September 27, 1856.

2298. ALFRED VINCENT NEWTON, of Chancery-lane, for sewing machinery.—Dated October 1, 1856.

December 12, 1856.

1392. PHILIP UNWIN and JOHN UNWIN, of Sheffield, for the manufacture of pen and pocket knives.—Dated June 12, 1856.

1394. JAMES FAIRCLOUGH, of Liverpool, for an expander and contractor for dining tables.—Dated June 12, 1856.

1414. WILLIAM SEED, of Preston, for "lap machines" or apparatus used in the preparation of cotton and other fibrous substances for spinning.—Dated June 14, 1856.

1415. EDWARD LINDNER, of New York, for breech-loading firearms.—Dated June 14, 1856.

1420. JAMES BALL MANNIX, of Westminster, for a method of applying locomotive power to the working of inclines.—Dated June 16, 1856.—(A communication.)

1434. RAYMOND LEOPOLD DE BERENGER, of Enfield, for nosebags. —Dated June 18, 1856.

1435. THOMAS BURTON, of Padiham, for machinery or apparatus for sizeing and dressing warps, yarns, or threads.—Dated June 18, 1856.

1449. JACINTO DIAS DAMAZIO, of Lisbon, for a new process of making illuminating and heating gas by a double distillation without retort.—Dated June 19, 1856.

1501. GUSTAVE DURRICH, of Stuttgart, and of Chancery-lane, for gas burners.—Dated June 26, 1856.—(A communication.)

1531. EBENEZER ROGERS, of Abercarn, and HERBERT MACKWORTH, of Clifton, for coking, and in apparatus for that purpose — —Dated June 30, 1856.—(Partly a communication.)

1542. JOHN LACEY DAVIES, jun., and JOHN BROADBENT, of Manchester, for umbrellas and parasols.—Dated July 1, 1856.

1553. WILLIAM FREDERICK SPITTLE, of Birmingham, for braiding or plaiting machinery.—Dated July 2, 1856.

1775. ISHAM BAGGS, of Manchester-street, Argyle-square, for lighting, signalling, and telegraphing by means of electricity.—Dated July 25, 1856.

1932. JAMES LEACH, WILLIAM TURNER, and JOHN TEMPEST, of Rochdale, for rollers applicable to condensing, and all other kinds of engines for carding wool, cotton, and other fibrous materials.—Dated August 19, 1856.

2294. JOHN HOLMAN, of Topsham, for ships' rudders.—Dated October 1, 1856.

December 16, 1856.

1430. FREDERICK COLLIER BAKEWELL, of Hampstead, for percussion bomb shells.—Dated June 17, 1856.—(A communication.)

1442. WILLIAM HUNT, of Tonge, for machinery or apparatus for polishing and finishing yarns or threads.—Dated June 19, 1856.

1448. WILLIAM PARSONS, of Pratt-street, for washing and bleaching woven fabrics.—Dated June 19, 1856.

1452. JOHN TALBOT PITMAN, of Gracechurch-street, for a new method of using the electric current or currents for telegraphic and other purposes.—Dated June 20, 1856.—(A communication.)

1455. JONATHAN HAGUE, of Ashton-under-Lyne, for machinery or apparatus for manufacturing bands or cords for driving machinery and other purposes.—Dated June 20, 1856.

1468. GOLDSWORTHY GURNEY, of Bude, for warming and moistening air.—Dated June 23, 1856.

1502. JOHN GRATRIX, of Preston, and ALFRED KNIGHT, of Birmingham, for apparatus for registering a permanent record of the

speed of steam or other engines, which apparatus is also applicable to watchmen's registers and other similar purposes.—Dated June 26, 1856.

1510. BASILIO SCARIANO and RAPHAEL PAUL DE VILLAMIL, of Paris, for apparatus for measuring and setting out the forms of garments.—Dated June 26, 1856.

1514. CHARLES AUGUSTUS PRELLER, of Lant-street, for unhairing and preparing skins, and in tanning.—Dated June 27, 1856.—(A communication.)

1518. GEORGE HENRY ORMEROD, of Newchurch, for machinery for brushing and cleaning cotton fabrics.—Dated June 28, 1856.

1526. CHARLES ARMAND MASSAGER-ABIT, of Paris, and South-street, London, for the treatment of fibrous substances.—Dated June 28, 1856.

1536. CHARLES WOIDE GOODHEART, of Woodlands, for bars or gratings for the security of buildings and other property.—Dated July 1, 1856.

1554. EDWIN GREEN, of Birmingham, for buttons.—Dated July 2, 1856.

1562. ALFRED VINCENT NEWTON, of Chancery-lane, for machinery for manufacturing rope or cordage.—Dated July 2, 1856.

1729. CLOTHIDE AMET, of Tavistock-street, for means of distending articles of dress and preserving the form or shape thereof.—Dated July 22, 1856.—(A communication.)

1936. HENRY BURDEN, of Troy, New York, for machinery or apparatus for manufacturing shoes for horses, mules, and other animals.—Dated August 19, 1856.

2096. ALFRED VINCENT NEWTON, of Chancery-lane, for machinery for cutting india-rubber and other substances into threads or narrow strips.—Dated September 8, 1856.—(A communication.)

2217. THOMAS EVANS BLACKWELL, of Clifton, for fire-flues and air-passages.—Dated September 20, 1856.

2243. THOMAS HOLMES and THOMAS ASPINALL, of Pendleton, for preventing or diminishing the production of smoke in fireplaces and furnaces, and for effecting its combustion.—Dated September 25, 1856.

2252. MATTHEW ANDREW MUIR and WILLIAM JAMES WALKER, of Glasgow, for machinery or apparatus for sizeing or dressing yarns or threads.—Dated September 25, 1856.

2360. HENRY WATSON and JOHN DIXON, of Newcastle, for cocks and valves.—Dated October 8, 1856.

2424. JANE ELIZABETH REED, of Southgate, for a mixture or compound for the cure of asthma, consumption, and other affections of the chest or lungs.—Dated October 17, 1856.

2430. JOHN McDOWALL, of Johnstone, for sawing or cutting wood.—Dated October 17, 1856.

2434. ALFRED VINCENT NEWTON, of Chancery-lane, for tufted pile fabrics.—Dated October 17, 1856.

December 19, 1856.

1774. JOHN MACINTOSH, of Great Ormond-street, for the application of incendiary materials to be used in warfare.—Dated August 6, 1855.

1441. GEORGE TILLETT, of Clapham, for bedsteads.—Dated June 19, 1856.

1443. FRANCIS GYBBON SPILSBURY, of Chaudfontaine, for soda and alum.—Dated June 19, 1856.

1445. THEODORE SCHWARTZ, of New York, for an improved brick. —Dated June 19, 1856.

1453. JAMES BULLOUGH, of Accrington, for looms.—Dated June 20, 1856.

1456. MICHAEL THOMAS CROFTON, of Leeds, for inking stamps used by bankers and others.—Dated June 20, 1856.

1462. ELIAS ROBISON HANDCOCK, of Dublin, for engines to be worked by steam or other motive power.—Dated June 21, 1856.

1465. WILLIAM VALENTINE MILLER, of Portsmouth, for propelling vessels.—Dated June 23, 1856.

1470. JAMES ATKINSON LONGRIDGE, of Fludyer-street, for obtaining and applying motive power.—Dated June 23, 1856.

1471. GEORGE RILEY, of the Grove, Lambeth, for a refrigerator for cooling brewers' and distillers' worts.—Dated June 23 1856.

1472. JOHN MILLER, of Drogheda, for furnaces.—Dated June 23, 1856.

1476. CHARLES MILLS, of High-street, Camden-town, for hammer rails of pianofortes.—Dated June 23, 1856.

1479. JOHN SAXBY, of Brighton, for working the points and signals of railways at junctions to prevent accidents.—Dated June 24, 1856.

1481. JOSEPH HARRISON, of Blackburn, and CHRISTOPHER GELDERD, of Lowmoor, for machines for warping and sizeing, or otherwise preparing yarns or threads for weaving.—Dated June 24, 1856.

1499. JAMES KENYON and RICHARD KENYON, of Bury, for an improved fabric to be used in printing and other similar purposes.— Dated June 25, 1856.

1511. WILLIAM HUDSON, of Burnley, and CHRISTOPHER CATLOW, of Clithero, for looms for weaving.—Dated June 26, 1856.

1522. BEVAN GEORGE SLOPER, of Kentish Town, for freezing, refrigerating, and cooling.—Dated June 28, 1856.

1525. WILLIAM MCADAM, of Glasgow, for the manufacture of articles of clay and such like plastic substances.—Dated June 28, 1856.—(A communication.)

1557. THOMAS EMMANUEL MARAIS, of Ferrières, France, for railway signals.—Dated July 2, 1856.

1558. JOHN WILLIAMSON and JAMES COCHRAN STEVENSON, of South Shields, for evaporating saline solutions.—Dated July 2, 1856.

1567. JOSEPH BROWN, of Leadenhall-street, for hats and caps.— Dated July 3, 1856.

1573. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for cleaning and carding cotton and other fibrous substances.—Dated July 4, 1856. —(A communication.)

1577. JOSEPH ADSHED, of Manchester, for materials to be used as a substitute for plastering, painting, papering, whitewashing, and colouring.—Dated July 5, 1856.

1585. Robert Millward, of Patricroft, for a screw key or gauge. —Dated July 7, 1856.

1593. Henry Smith, of Dudley, for harrows.—Dated July 7, 1856.

1607. Robert Martineau and Brooke Smith, of Birmingham, for taps for drawing off liquids.—Dated July 8, 1856.

1649. William Petrie, of Woolwich, for a new porous material for filters, and to be used as a substitute for stone and earthenware.— —Dated July 12, 1856.

1679. Adolphus Frederick Gurlt, of Newington-place, for the manufacture of iron and steel.—Dated July 16, 1856.

1725. John Edward Hodges, of Leicester, for looped fabrics.— Dated July 21, 1856.

1740. Samuel Frederic Berthiez, of Red Lion-street, Borough, for engines to be worked by a new elastic fluid.—Dated July 23, 1856.

2477. Alfred Vincent Newton, of Chancery-lane, for reefing, furling, and unfurling of sails.—Dated October 21, 1856.

December 22, 1856.

1240. John Dixon, of Newcastle-upon-Tyne, for apparatus for measuring water and other liquids.—Dated May 23, 1856.

December 24, 1856.

1500. Louis Cornides, of Trafalgar-square, for ornamenting metal, wood, leather, textile fabrics, and other substances.—Dated June 25, 1856.

1517. Edward Burnand, of Moudon, for fire-arms.—Dated June 27, 1856.

1534. Cornelius Moriarty, of Greenwich, for the construction of tube brushes used in cleaning the tubes of marine, locomotive, and all kinds of multitubular boilers.—Dated June 30, 1856.

1591. George Sampson, of Bradford, for finishing fabrics.—Dated July 7, 1856.

1627. Richard Dugdale Kay, of Accrington, for machinery or apparatus for pressing, straining, sifting, or refining colours and thickening mordaunts.—Dated July 9, 1856.

1628. Robert Thomas Eadon, of Sheffield, for band saws and other endless bands or hoops of metal.—Dated July 9, 1856.

1640. Thomas Charlton and William Turnbull, of Brentwood, for steam generators.—Dated July 11, 1856.

1664. Arthur Neild, of Manchester, for Jacquard and other pattern looms.—Dated July 15, 1856.—(A communication.)

1678. George Eskholme and Henry Wilkes, of Rotherham, for ball cocks and cocks in general for drawing off fluids.—Dated July 16, 1856.

1683. John Cartwright, of Shrewsbury, for agricultural implements, called chain harrows, for more effectually dressing and cleaning land.—Dated July 17, 1856.

1704. William Stettinius Clark, of Warwick-street, for machinery or apparatus for digging, pressing, and moulding peat.— Dated July 19, 1856.—(A communication.)

1728. Alfred Vincent Newton, of Chancery-lane, for machinery for reaping and mowing.—Dated July 22, 1856.—(A communication.)

1736. John Imray, of Lambeth, for bending timber.—Dated July 22, 1856.

1850. Augustus Pfaltz, of Massachusetts, for making soap from rosin.—Dated August 5, 1856.

1890. Edwin Firth, of Heckmondwike, for finishing mohair cloth. —Dated August 12, 1856.

1902. Thomas Bilbe, of Rotherhithe, for the construction of ships and other vessels.—Dated August 14, 1856.

2131. Constant Jouffroy Dumery, of Paris, for apparatus for counting, registering, and indicating the distance travelled by vehicles, and the speed and time of travelling.—Dated September 11, 1856.

2132. William Stettinius Clark, of Camden-town, for hydraulic heaters or furnace.—Dated September 12, 1856.—(A communication.)

2199. Amos Hustler, of Bradford, for looms for weaving.—Dated September 19, 1856.

2219. Robert Mushet, of Coleford, for the manufacture of iron and steel.—Dated September 22, 1856.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(*To the* 20*th December*, 1856, *inclusive.*)

2758. Georges Edouard Gazagnaire, of Marseilles, and Castle-street, Holborn, for the manufacture of nets for fishing and other purposes.—Dated November 26, 1856.

2762. Louis Cornides, of Trafalgar-square, Charing-cross, for combining gelatine with certain other substances, and colouring the same so as to produce various objects capable of resisting atmospheric influences.—Dated November 26, 1853.

2771. John Carter Ramsden, of Bradford, for apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.—Dated November 28, 1853.

2778. Auguste Edouard Loradoux Bellford, of 16, Castle-street, Holborn, for fire-arms.—Dated November 29, 1853.—(A communication.)

2783. Peter Armand le Comte de Fontainemoreau, of Paris, and South-street, Finsbury, for the construction of the Jacquard machine.—Dated November 30, 1853.—(A communication.)

2804. Alexander Brown, of Glasgow, for metallic casks and other vessels.—Dated December 2, 1853.

2772. Alexander Macomie, of Percy-street, Rathbone-place, for an ornamental piece of furniture shaped like a vase, constructed to contain or form a writing and drawing desk.—Dated November 28, 1853.

2788. John Patterson, of Beverley, for land-rollers or clod-crushers.—Dated November 30, 1853.

2784. Edward Keating Davis, of Howley-street, Lambeth, for

machinery for making pipes, sheets, still-worms, and other articles from that class of metals called soft metals, as lead, tin, zinc, bismuth, or alloys of soft metals that are capable of being forced out of metal receivers or chambers through dies, cores, &c.—Dated November 30, 1853.

2798. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for the treatment or manufacture of caoutchouc.—Dated December 1, 1853. —(A communication.)

2810. SAMUEL C. LISTER, of Bradford, for combing wool, hair, cotton, and other fibrous materials.—Dated December 2, 1853.

2820. SQUIER CHEAVIN, of Spalding, for a double-action or belt filterer.—Dated December 5, 1853.

2851. JOSEPH ROBINSON, of Carlisle, for mills for grinding corn and other substances.—Dated December 8, 1853.

2812. JONATHAN SAUNDERS, of St. John's-wood, for the manufacture of rails for railways.—Dated December 2, 1853.

2834. WILLIAM EDWARD GAINE, of Harewood-street, Harewood-square, for treating or preparing paper.—Dated December 6, 1853.

2906. SAMUEL MESSENGER, of Birmingham, for improvements in railway, ship, and carriage lamps.—Dated December 15, 1853.

2823. MATTHEW ANDREW MUIR, of Glasgow, for check and fancy weaving.—Dated December 5, 1853.

2865. RICHARD ECCLES, of Wigan, JOHN MASON and LEONARD KABERRY, of Rochdale, for slubbing and roving frames for cotton and other fibrous substances.—Dated December 9, 1853.

2872. JOHN BOURNE, of Port Glasgow, for steam engines.—Dated December 9, 1853.

2891. WILLIAM FREDERICK PLUMMER, of Southwark, for machinery for grinding or crushing animal, vegetable, and mineral substances.—Dated December 13, 1853.

2951. AUGUSTE EDOUARD LORADOUX BELLFORD, of Castle-street, Holborn, for presses for expressing oil or other fluids from fruits, grains, or other sustances.—Dated December 19, 1853.—(A communication.)

2964. ARCHIBALD THOMSON, of Glasgow, for setting out and marking the rivet-holes in the plates used in constructing iron ships, boats, boilers, and other vessels.—Dated December 20, 1853.

2837. JULIAN BERNARD, of Regent-street, for machinery or apparatus for stitching or uniting and ornamenting various materials.—Dated December 6, 1853.

2839. ALFRED VINCENT NEWTON, of Chancery-lane, for fire-arms and ordnance.—Dated December 6, 1853.—(A communication.)

2846. WILLIAM THOMAS HENLEY, of St. John-street-road, for electric telegraphs.—Dated December 8, 1853.

2860. ARTHUR JAMES, of Redditch, for counting, measuring, and weighing needles, and in preparing papers to receive the same.—Dated December 9, 1853.

2859. PIERRE MARIE FOUQUE, Civil Engineer, LOUIS RENE HEBERT, and VINCENT ETIENNE DORET LE MARNEUR, of Paris, and of Laurence Pountney-lane, Cannon-street, London, for rudders.—Dated December 9, 1853.

2892. CHRISTIAN SCHIELE, of Oldham, for preventing undue oscil-

lation in engines, machinery, carriages, and other apparatus.—Dated December 13, 1853.

2997. Frederick Crace Calvert, of Manchester, for the treatment of naphthas and other volatile hydrocarbons, and in the application of the same.—Dated December 27, 1853.—(A communication.)

2899. John Zuill Kay, of Dundee, for gas-meters.—Dated December 13, 1853.

83. Auguste Edouard Loradoux Bellford, of Castle-street, Holborn, for the manufacture of glass.—Dated January 12, 1854.—(A communication.)

2890. James Wansbrough, of Guildford-street, for waterproof fabrics.—Dated December 13, 1853.

2921. William Tranter, of Birmingham, for fire-arms and in bullets and waddings to be used therewith.—Dated December 16, 1853.

2933. Charles Goodyear, of St. John's-wood, for the treatment and manufacture of india-rubber.—Dated December 16, 1853.—(A communication.)

2942. John Greenwood, of Arthur-street West, for preventing draughts of air into rooms and places when the doors and windows are shut.—Dated December 17, 1853.

2956. Josiah Latimer Clark, of Chester-villas, Islington, for insulating wire used for electric telegraphs, with a view to obviate the effects of return or inductive currents.—Dated December 20, 1853.

2897. John Ambrose Coffey, of Providence-row, Finsbury, for evaporating liquids.—Dated December 14, 1853.

2912. Jean Baptiste Pascal, of Lyons, and of Castle-street, Holborn, for obtaining motive power.—Dated December 15, 1853.

2913. Frederick William Branston, of Clapham, for tablets, labels, and signs, or their surfaces, exhibiting letters and designs.—Dated December 15, 1853.

2939. George Anderson, of Rotherhithe, for apparatus used in manufacturing gas, which apparatus is also applicable when transmitting gas from one place to another.—Dated December 17, 1853.

2943. Isaac James, of Cheltenham, for carts for distributing water or liquid manure.—Dated December 17, 1853.

3022. Alfred Vincent Newton, of Chancery-lane, for the manufacture of screws.—Dated December 29, 1853.—(A communication.)

2937. Joseph Sharp Bailey, of Keighly, for operating upon wool, alpaca, mohair, and other fibrous materials, preparatory and prior to being spun.—Dated December 17, 1853.

3009. John Barnes, of Church, for dyeing and cleansing cotton, silk, and other fabrics.—Dated December 28, 1853.

2966. Gotlieb Boccius, of Hammersmith, for breeding and rearing of fish.—Dated December 21, 1853.

2985. Francis Bennoch, of Wood-street, Cheapside, for coating silk and other yarn or thread with gold or other metal.—Dated December 23, 1553.—(A communication.)

3004. James Taylor, of Birkenhead, for raising and lowering weights.—Dated December 28, 1853.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 2. Vol. XXIX. ENLARGED SERIES.—FEBRUARY, 1857.

Specification of the Patent granted to Richard Chrimes, *of Rotherham, in the County of York, Brass Founder, for Improvements in Buffers and other Springs for Railway and other Carriages.*—Dated April 9, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention relates to a peculiar arrangement of helical springs for obtaining an elastic buffing action, and for breaking the shocks arising from the inequalities of the road or the tractive power of the engine, whereby a cheaper and more simply constructed spring is obtained than heretofore.

The improvement consists in placing two or more helical springs of the same or different lengths in a suitable spring box, in which works the inner head of the buffer rod or ram, or the rod or ram which receives the shocks to be deadened. The springs are of a helical construction, and are arranged concentrically one inside another, the inner springs being made of smaller diameter for that purpose. As the springs are contained in one common spring box, without any partitions

to divide or separate them from each other, it is necessary, in order to prevent one spring from becoming entangled or foul of another, to make them of contrary twists, that is, right and left springs alternately. To obtain a gradually increasing resistance, and render the springs compensating, they may be made of varying lengths, so that as the pressure increases more springs will be successively called into play, offering an increasing amount of resistance corresponding with the increased pressure.

And in order that the said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose I shall refer to the several figures on the sheet of drawings hereunto annexed, the same letters of reference indicating corresponding parts throughout both figures.

Fig. 1 of my drawings represents a side elevation of an improved engine buffer, with a portion of the spring boxes broken away to show more clearly the helical springs inside; and

Fig. 2, is a longitudinal vertical section of a truck buffer constructed on the same principle, namely, with two helical springs.

The helical springs, 1, 2, and 3, are contained in one common spring box, A, without any partitions to separate them from each other. The outer spring is both longer and of larger diameter than the second spring, 2, which is placed inside it, which latter spring is longer and of larger diameter than the third spring, 3 (see fig. 1), which is placed inside 2; and in order to prevent the springs from locking or becoming foul of each other, I use a spring which is twisted or turned in a right-hand direction alternately with a spring twisted or turned in a left-hand direction, so that two having the same direction of twist are never placed together. By this simple arrangement I obviate all chance of their becoming locked with each other, which would be the case if two springs, twisted in the same direction, were placed together without some division piece to keep them separate from each other.

It is obvious that any convenient number of springs may be used, so that one is placed inside another, and by making them of various lengths I obtain a gradually increasing resistance, which is brought into play as the pressure increases, the combined springs having a compensating action, as they will come into action successively, that is to

say, the longer ones first, and then the shorter ones, according to their several lengths. I may here observe, however, that I wish it to be distinctly understood that I lay no claim to the use of helical springs of different lengths, or to the use of helical springs placed one inside another, and arranged to come into successive operation when subjected to compression; but what I consider the main feature of my said invention is, the employment of two or more helical springs of the same or different lengths, and arranging them concentrically one inside another in one common spring box, such helical springs being turned or twisted in opposite directions, and being arranged so that no two springs having the same direction of twist are placed together. The spring box, by this arrangement, not needing partitions to divide the springs one from another, will be obviously reduced in weight, and the manufacture of the same will be much more economical. The arrangement of springs hereinbefore described is obviously applicable not only to buffers, but also to bearing and draw springs for railway and other carriages.

Having now described and particularly ascertained the nature of my said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of my said invention.—In witness, &c.

Richard Chrimes.

Specification of the Patent granted to William Armitage, *of Farnley Iron Works, and* Henry Lea, *Manager to the Farnley Iron Company, both of Farnley, near Leeds, in the County of York, for An Improvement in the Manufacture of Iron.*—Dated April 16, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— The first part of our said invention relates to the manufacture of cast iron as reduced from its ores, and consists in combining and introducing steam along with cold blast into

the smelting furnace, for the purpose of getting rid of a great portion of the sulphur, phosphorus, carbon, and other impurities contained in iron, and thus purifying the same during the smelting thereof.

The second part of our said invention relates to the further purification of the iron, smelted as above stated, after it has been run into pigs, and consists in operating upon the pigs in a refinery-furnace with steam and cold blast, as above stated, for the purpose of preparing the iron for the puddling furnace; and we would here observe that our invention applies specially to the manufacture of iron intended to be rolled into plates for the use of boiler makers, in the manufacture of locomotive and other steam boilers, and other vessels required to stand great pressure, and for these purposes we have found our invention well adapted, as the iron thus manufactured is free from blisters, is tougher and denser, and in all respects better adapted for the use of boiler makers, than boiler plates as heretofore manufactured.

In order to explain our said invention as completely as possible, we now proceed to describe the best means we are acquainted with for carrying the same into practical effect, reference being had to the illustrative sheets of drawings hereunto annexed, and to the numeral figures and letters of reference marked thereon respectively, as follows:—

Description of the Drawings.

Sheet 1, exhibits a transverse and vertical section of an ordinary smelting furnace, showing the mode of adapting our invention thereto.

At sheet 2, fig. 1 exhibits a transverse and vertical section of an ordinary refinery furnace, also showing the adaptation of our invention thereto. Fig. 2, is a detached portion hereinafter referred to. At each of the foregoing figures we employ similar letters of reference to denote corresponding parts, in so far as such parts appear or can be seen at each of such said figures respectively.

At sheet 1, *a*, is a steam pipe for conveying steam from a boiler into a steam chest or receiver, *b*, *b*, from whence the steam passes by the pipe, *c*, *c*, into the air pipe, *d*, in which the steam, as it enters, mixes with and is taken up and along with the blast, and is forced into the blast furnace through the nozzle pipe, *e*, by a fan blast or other suitable means; *f*, is an ordinary tuyere; *g*, the furnace;

h, stop-cock for regulating the supply of steam into the air pipe; *i*, a pipe for drawing off the condensed steam from the chest, *b*. In operating upon the ores of iron, during the smelting thereof in the furnace in the first stage of manufacturing cast iron, we have found in practice that the best results are obtained when the pressure of steam to the blast is in the proportion of about 7 lbs. more or less of steam per square inch to about one pound and three-quarters more or less of blast per square inch.

We now proceed to describe the mode of adapting our invention to the refinery furnace exhibited at sheet 2, as follows:—*a*, *a*, is the steam pipe for conveying steam from a boiler into a steam chest or receiver, *b*; *c*, *c*, a steam pipe conveying the steam from the chest, *b*, to the air box, *d*, by the branch pipes, c^1, c^1, c^1, (shown at fig. 2,) fixed air-tight into the top of said box; the bottom of the box, *d*, is fitted with a valve, *e*, opening inwards, and immediately beneath such said valve the air pipe, *f*, is fixed, and is connected by its opposite end to the fan blast; *g*, *g*, *g*, are leather pipes connected by one end to openings in the box, *d*, and by their opposite ends to three nozzle pipes, *h*, *h*, *h*, only one of which is shown by the drawing; *i*, an ordinary tuyere; *k*, ordinary water boxes for keeping the tuyeres cold; *l*, the tuyere plate; *m*, water box for supply of water; *n*, water pipe for supplying the tuyeres; *o*, waste water pipe; *p*, *p*, hearth of the furnace; *q*, waste pipe for condensed steam; *r*, stop-cock for regulating supply of steam to air pipe.

The mode of operating with the steam and blast is precisely similar in this furnace to that before mentioned in reference to the blast furnace, the steam and blast mixing together in the box, *d*, and passing into the furnace. When the metal thus operated upon by the blast has been sufficiently blown and adjusted by the bar and cinder, the workman then taps the furnace, and the metal flows therefrom into iron moulds; the metal when cold is then broken up and removed to the puddling furnace, there to be converted into malleable iron in the manner well known and commonly practised.

Having now fully described and set forth the nature and object of our said invention of "An Improvement in the Manufacture of Iron," together with the best means we are acquainted with, and which we have found answer well for carrying the same into practical effect, we would remark, in conclusion, that we are aware of steam and atmospheric air

having heretofore been separately employed in the manufacture of iron; we do not therefore claim as our invention the use of steam and atmospheric air or blast when introduced separately into blast furnaces and refinery furnaces; but what we do claim as our invention, intended to be secured to us by the above in part recited letters patent is,—

Firstly, the combining and admixing of steam with atmospheric air or blast, and the employment thereof in blast furnaces used in the manufacture of iron, as above particularly described, so that the blast and steam shall enter the furnace in combination.

And, secondly, we claim the use of steam mixed with the blast as above stated, and the employment thereof combined in refinery furnaces for still further purifying the iron which has been smelted in the above-mentioned blast furnace, as above stated, and thereby constituting "An Improvement in the Manufacture of Iron."—In witness, &c.

William Armitage.
Henry Lea.

Specification of the Patent granted to Charles William Ramie, *of* 73, *Denbigh-street, Pimlico, in the County of Middlesex, for Improvements in Constructing the Permanent Ways of Railways.*—Dated April 4, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in constructing the permanent ways of railways. For this purpose, ordinary double-headed rails are used, and they are supported and retained in position in the following manner:—On either side of the rails are fixed, by screw-bolts or otherwise, wings or plates, which, by resting on the ground, form longitudinal bearers to the rails, and such wings or projecting plates are fixed, either continuously or at intervals; and if at intervals, it is preferred that the spaces between the wings or projecting plates should not come opposite each other, but be alternately on either side of the rail to which they are fixed. It should be stated that it is not new to obtain longitudinal bearings or supports by

fixing plates or wings to the sides of a rail, but the plates or wings, according to this invention, are made bent or rolled in the form of angle iron, so that the edge of a plate or wing will, where it is in contact with the web or side of the rail, lie close thereto, and admit of bolts being passed through the rail and through that portion of the wing or plate in contact therewith, and the plate then comes in contact with the lower head of the rail and rests thereon; the plate or wing is then found to incline upwards from the lower part of the rail to the outer edge of the plate or wing in order to facilitate packing. On the under sides of these wings or projecting plates are fixed, either at intervals or continuously, bent plates or angle irons; the flanges of these bent plates or angle irons come under the rail, and, by being fixed by rivets or otherwise to the wings or projecting plates, are then, by screw bolts or by cotter bolts, capable of being drawn towards each other, and not only to form under supports for the rail, but at the same time cause those parts of the wings or projecting plates to clip and hold securely on the lower head of the rails.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

In carrying out my invention I can use the ordinary double-headed rail. My invention is not, however, dependent on the form of rail used. My invention consists, as above stated, of applying on either side of the rails of a railway bent wings or plates of iron, in such manner that the wings or plates incline upwards from the lower parts of the rails.

Description of the Drawing.

Fig. 1, shows a transverse section of a double-headed rail, *a*, having fixed thereto a wing or bent plate of iron, *b*, on either side by screw bolts or nuts, *c*. These wings, *b*, may form a continuous bearer from end to end of the railway or may only be used at intervals, in which case I prefer that the intervals or spaces between the wings, *b*, should not be opposite each other, but that the spaces or intervals, where no wing is applied, should be alternate, first on one side and then on the other side of the rail; and in some cases it is desirable that the joints, or coming together of the ends of the wings or plates, should not coincide with the ends of the

rails, but should, on the contrary, break joint therewith, and thus will a railway be joined from end to end without the necessity of "fishing" the ends of the rails. c^1, c^1, are further plates, fixed by rivets or otherwise to the under sides of the wings, *b*, *b*. These plates, c^1, c^1, may be applied at intervals, and it is preferred they should be when the wings or plates, *b*, *b*, are of considerable length, or the plates, c^1, c^1, may be dispensed with, or they may be used as longitudinal bearers, whilst the plates, *b*, *b*, may be of comparatively short lengths, as shown in fig. 2, which represents another mode of applying side wings, *b*, *b*. In this arrangement, these wings, *b*, *b*, are supposed to be in short lengths, and to be applied at intervals, whilst the bent plates, c^1, c^1, are of greater length, and may be continuous bearers of the rail, *a*. The plates, c^1, c^1, support the lower head or part of the rail, *a*, and, by means of screw bolts and nuts or of cotter bolts, the plates, c^1, c^1, are drawn together and are made strongly to clip the rail between them and the wings or bent plates, *b*.

Fig. 3, shows another arrangement, wherein the bent plates or wings, *b*, *b*, are fixed to the rail, *a*, by cotter bolts, and such wings are supposed to be of considerable length, whilst the bent plates, c^1, c^1, are of short lengths and only applied at intervals, and their lower flanches are retained together by a tie rod, *d*, as shown.

Fig. 4, shows a transverse section of a rail, *a*, where the wings, *b*, are fixed to the rail by keys or wedges. The wings, *b*, in this arrangement are of short lengths, and affixed to the rails, *a*, at intervals, and their extent of surface bearing is increased by having separate plates, b^1, fixed thereto by rivets, keys, or otherwise; and it is preferred, when using this arrangement, together with under plates, c^1, that the under plates, c^1, should be applied below the bent plates or wings, *b*, *b*, and that they should hold the plates, b^1, b^1, between them. I would state that, although the plates, b^1, b^1, are shown to be curved, this may be varied, and they may be made flat, the parts of the wings, *b*, and plates, c^1, which hold them, being made accordingly.

Fig. 5, shows a transverse section of another rail, *a*, having wings or bent plates, *b*, fixed on either side, and in place of using bent plates, c^1, c^1, and tie rods, a transverse bearer, *e*, is applied and affixed to the wings, or bent plates, *b*, *b*.

Fig. 6, shows a transverse section of another rail, *a*, with wings, *b*, *b*, applied thereto, but in this arrangement the wings, *b*, are not fixed to the rail, but to a bent plate, *f*, which at intervals forms part of the tie bars for preserving the gauge.

Figs. 7, 8, 9, 10, and 23, show sections of a rail, *a*, with only one head. *b*, *b*, are the wings or bent plates applied on either side thereof, and such wings, *b*, incline upwards from the lower parts of the rails, *a*, *a*, as before described in respect to the double-headed rails. In fig. 8, the under bar, *x*, passes through the rail.

Figs. 11, 12, 13, and 14, show sections of bridge rails, with wings or bent plates, *b*, *b*, on either side thereof.

Fig. 15, shows a section of another form of rail, with wings, *b*, *b*, on either side.

Figs. 16, 17, 18, 19, 20, and 22, show sections of rails where one of the bent plates or wings, *b*, has the rail, *a*, formed thereon, the other bent plate or wing, *b*, being fixed thereto, as shown in these arrangements; that which is the peculiarity of my invention is retained, viz., the bent plates or wings, *b*, incline upwards on either side of a rail from the lower parts of the rails, *a*.

Fig. 21, shows a section of a rail, *a*, *a*, made of two parts, each having a wing, *b*, formed therewith, which inclines upwards; and I would state, that it is not new to make rails of two parts longitudinally. I do not claim the same, nor, in fact, any of the forms of rails shown; my claim to invention in all cases being the mode of applying wings or bent plates to the sides of rails, such bent plates or wings inclining upwards from the lower parts of the rails, *a*.

Figs. 24 and 25, show two sections of trough or bridge rails, with wings or bent plates, *b*, *b*, fixed to them on either side, as shown. I would remark generally, that in all cases I prefer to apply the wings or bent plates, *b*, *b*, or c^1, c^1, to the rails, *a*, in such manner as to break joint with the rails and with each other, in order to avoid the use of fish "plates" to the ends of the rails, *a*, *a*.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I make no claim to any of the parts separately; but what I claim is, the construction of the permanent ways of railways, by applying wings or bent plates

on either sides of the rails, such wings inclining upwards from the lower parts of the rails, as herein described.—In witness, &c.

CHARLES WILLIAM RAMIE.

Specification of the Patent granted to WILLIAM JOSEPH CURTIS, *of* 1, *Sebbon-street, Islington, for Improvements in Lubricating the Axles of Locomotive Engines and of Carriages on Railways.*—Dated April 8, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in lubricating the axles of locomotive engines and of carriages on railways; and the improvements consist of causing the lubricating fluid to be raised from below the axles by centrifugal action, which is most conveniently accomplished by applying a disc or projection to each of the axles, the periphery of which rotates in a vessel below the axle, and by centrifugal action constantly raises the lubricating fluid above the axle, and throws or projects it against a suitable surface and receptacle for conducting the fluid down on to the upper surface of the axle.

Having thus stated the nature of the invention, I will proceed more fully to describe the manner of performing the same.

Description of the Drawing.

Fig. 1, is a longitudinal section;

Fig. 2, a top view;

Fig. 3, a cross section, drawn upon a half scale; the letters referring to corresponding parts in each drawing.

A, is the axle box case; B, the axle; C, the upper bearing or brass; D, the disc, fastened to the end of the axle by the screw, E, and prevented from turning by the stud, *f; d, d, d, d, d, d,* are projections on the disc, D; *g*, is the discharge hole and screw in the bottom of the case to blow out the oil or lubricating medium when it may be necessary to cleanse the axle box; *h*, the feed hole and screw to feed or charge the apparatus; I, is the front plate, held in

its place by the screws, which is kept fluid-tight by a good joint; *k*, *k*, *k*, are three receptacles for the lubricating fluid, communicating with the side channel, *n*; *l*, *l*, *l*, are three receptacles communicating with the side channel, *m*; O, is the lubricating fluid in the lower part of the axle box; *p*, is the spring upon the top of the axle box; Q, the guard irons; R, R, are set screws acting upon the side brasses or bearings, *s*, *s*; T, T, are stop nuts, which prevent the screws losing their adjustment; U, is a circular brush, made of similar materials to a hat brush, which is kept against the back side of the box to keep out the dust; *v*, the stock of the brush, which fits upon the axle between the bearing and boss of the wheel; this is adjusted by the screw, *w*, so that as the brush wears it may be moved towards the axle box; X, is the upper part of the box casing; Z, is the boss of the wheel.

The action of the apparatus is as follows:—The lubricating medium I prefer is soft soap with water; or I can use oil or other lubricating fluid, which is supplied to the apparatus through the feed hole, kept closed by the screw, *h*. When the axle is at rest the lubricating medium sinks to the bottom of the box, as at O, but when the wheel turns round it is thrown by means of the disc and projections by centrifugal action to the upper part of the casing, X, whence it descends into the side channels, *n* and *m*, and thence flows to the upper receptacles, *k*, *l*, from which it descends to the axle through the central holes, 1, &c., and the lateral holes, 2, 2, 2, and 3, 3, 3. The object of this arrangement is to cause the lubricating medium to descend upon the rising side of the axle as well as upon the centre, and to descend in a stream, and not drop by drop, or by capillary action, as in ordinary bearings. The currents or streams are shown by the arrows. By means of the disc the lubricating medium is thrown to the upper side of the box, and bearing much more rapidly than it descends, so that, although the level of the lubricating medium in the lower part of the box when the axle is at rest is within a small space of the under side of the hole in the back of the box, as soon as the wheel rotates the lubricating fluid is thrown into the space above the axle; thus by no possible chance can the lubricating medium overflow or escape, and the back of the box is sealed against dust by means of the circular brush, U, the stock of which fits and slides

upon the end of the shaft between the boss of the wheel, z, and the back of the axle box; the hair of the brush being, as in the case of a hat brush, very flexible, adjusts itself to any oscillation of the box and wheel, and by centrifugal action, when in motion, the hairs of the brush are thrown outwards, and press with a slight pressure against the flange or ring, *y*, of the axle box, and thus effectually exclude dust, whilst no appreciable friction is produced, and by means of the set screw, w, the brush may be adjusted as the hairs wear away.

The front, I, of the axle box is moveable, and screwed by screws to the box, so that the state of the axle may be readily examined. Through the blow hole, *g*, any sediment or other matter may be blown out by hot water being poured into the feed hole, *h*, and thus the apparatus be easily and readily cleaned.

Three brasses or bearings are shown; the upper one, C, to bear the load, and the lateral, *s*, *s*, to resist the horizontal action of the engine, which latter are adjustable by means of the set screws, R, R, so that both the box axles may be always kept in trim or adjustment; and sometimes I employ bearings, the surfaces of which are tangents to the axle, and not curves fitting the axle. In this case the bearings should be made of hard metal.

Having thus described the nature of my said invention, and the manner of performing the same, I wish it to be understood that I do not confine myself to the form of apparatus, as other forms of discs or projections may be used, and the form of the channels for receiving and conducting the lubricating fluid to the top and side of the axle may be varied;—

But what I claim is,

The combined apparatus herein described for lubricating the axles of locomotive engines and railway carriages.—In witness, &c.

WILLIAM JOSEPH CURTIS.

Specification of the Patent granted to William Henry Gauntlett, *of the South Bank Iron Works, Eston Junction, near Middlesbrough-on-Tees, for Improvements in Thermometric Apparatus.*—Dated April 7, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in thermometric apparatus. For this purpose two tubes or rods of different metals are combined or fixed together at one end; the other end of each tube or rod is free or unattached, but they are connected and communicate with each other by means of suitable gearing in the following or other convenient manner:—To the free end of one tube or bar is fixed a dial or graduated plate, having thereon an axis, on which is placed a pointing hand and a pinion. The free end of the other tube or bar is made with or has fixed thereon a toothed rack, which takes into the teeth of the pinion. Hence, when the temperature varies, the two tubes or bars will vary in their expansion or contraction, and the pointing hand will indicate on the dial the temperature for the time being to which the thermometric apparatus is subjected. Or in place of the pointing hand being actuated by the toothed rack and pinion, other suitable gearing may be used.

Having thus stated the nature of my invention, I will proceed more fully to describe the manner of performing the same.

Description of the Drawings.

Fig. 1, is a back view of the case, showing the internal parts of the instrument;

Fig. 2, is a section through the line, *a*, *b*, of fig. 1;

Fig. 3, is a front view of the gauge, showing the dial plate; and

Fig. 4, is a view showing the application of the gauge to indicate the temperature of the hot blast from the heating stove of an iron smelting furnace; it is also applicable to numerous other purposes. In each of these figures the same letters are used to indicate the same parts. *c*, is the case containing the dial plate and gearing; *d*, is an internal flange for fixing dial plate to; *e*, is the dial plate;

f, is a pinion; *g*, is the pointer indicating degree of heat; *h*, is a spindle carrying the pinion, *f*, and the pointer, *g*; *i*, is a quadrant rack working into the pinion, *f*; *k*, is a spindle carrying the quadrant rack, *i*; *l*, is a metal tube screwed into the case, *c*; *m*, is another tube of different metal from *l*, attached to the tube, *l*, at the point, *n*; *o*, is a small pin, one end of which bears against the top of the tube, *m*, and the other against the quadrant rack, *i*, giving motion to the pointer, *g*; *p*, is a spring pressing the quadrant rack against the pin, *o*; *q*, is a small coiled spring, preventing play between teeth of the pinion and the quadrant rack; *r*, is a bracket carrying the two spindles, *h* and *k*; *s*, is a glass disc to protect the face of the dial plate; *t*, is a collar fastened to tube, *l*, for suspending the instrument (as in fig. 4).

The advantage in this heat gauge consists in its capability of indicating degrees of heat beyond the limits of the ordinary mercurial thermometer, the extent of its range being limited only by the fusing point of the metals of which it is composed. Its advantage also consists in the heat acting directly upon the sensitive part of the instrument, no intervening substance, such as glass, being made use of as in the case of the ordinary mercurial thermometer, by which that instrument is rendered unfit to be applied to high temperatures, in consequence of the dangei of its being destroyed by reason of the glass tube flying to pieces. Its capability of accurately measuring high degrees of heat, and the form of its construction, render that heat gauge peculiarly adapted for use in the heating stoves of blast furnaces, and other stoves and ovens wherein a high temperature is produced. It is equally efficient for lower temperatures, and for indicating the heat of the atmosphere and liquids.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I make no claim to any of the parts separately, nor do I confine myself to the details;—

But what I claim is,

The combination of two rods or tubes, of different metals attached to each other at one end and connected by toothed gearing at the other, as herein explained.—In witness, &c.

WILLIAM HENRY GAUNTLETT.

Specification of the Patent granted to LEWIS NORMANDY, *of* 67, *Judd-street, Brunswick-square, in the County of Middlesex, Civil Engineer, for Improvements in the Mode of Writing and Printing Music to Facilitate the Study thereof.*—Dated April 11, 1856.—(A communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The object of the invention is to facilitate the study of music and singing; for that purpose, the lines of the musical scale used in this mode of writing are of several colours, by which contrivance the reading of music is learned much more rapidly than heretofore. The annexed drawing shows the principle of the invention in reference to the reading and printing of music.

Fig. 2, shows the musical scale for the use of medium instruments or for the human voice. The five lines of the scale are indicated in their natural order by the figs. 1, 2, 3, 4, 5, the first line being green, the second black, the third dotted red, the fourth black, and the fifth red. The fundamental *do* is on an accidental dotted green line under the first line of the scale, and the tuning or diapason *la* is on another accidental dotted black line over the fifth line of the scale. In writing pieces of music on this medium scale, corresponding to the G or treble clef, the notes which are higher than *la* or lower than *do* should be on accidental lines placed in the same order as in the scale, namely, the acute or upper *do* on a dotted green line, the *mi* on a plain green line, and so on. In the same manner for the lower notes, the *la* below the fundamental *do* should be on an accidental dotted black line, the *fa* on a plain red line, and so on, following always the same order for accidental lines, as represented in fig. 2.

With respect to bass instruments, the music of which is written with the clef of F, the order of the standing scale should be altered, as seen in fig. 7, that is to say, the medium or fundamental *do* being in such music on the first upper accidental line, the said line is, of course, dotted green, and the order of the scale is, as may be seen, the first line black, the second dotted red, the third black, the fourth red, and the fifth dotted black; the first accidental line below is a plain green one, and so on.

In figs. 2 and 7, there are two corresponding gamuts written on the scales, the notes being on or between their respective lines, and the names of the notes are written over or under them; the two relative gamuts are in the major or minor key. In this system of writing music the keys become useless, since the *do* medium being placed on the dotted green line, this line may occupy any position in the scale, according to the acuteness of the instruments for which the music is written.

Fig. 1, of the drawing, is a front view of a common hand printing press, on the table of which is a compound printing plate, so arranged as to print at once the three required colours for my system of music writing. B, is the frame; L, the hand lever for working the press; D, screw; C, squeezing board; P, cast-iron table bearing the printing plates, N, V, R; the said plates may be removed, they are placed upon one another.

Fig. 6, is a longitudinal section of the said plates.

The plate, N, seen alone, fig. 3, is for printing all the blacks, namely, the lines where the notes *sol*, *re*, and *la*, as well as any other signs, and the writing.

The plate, V, seen alone, fig. 4, is for printing the green lines, that is to say, the lines on which *do* and *mi* are written.

The plate, R, seen alone, fig. 5, is for printing the red lines, that is to say, the lines on which the notes *si* and *fa* are placed. The said plates, as already stated, are moveable, so that each may be taken out separately in order to ink them with the different colours required, just as this operation is performed with ordinary presses. The plates are always placed in the same order as seen in fig. 6, that is to say, the plate, R, lying directly on the table, P, of the press; the plate, V, lying on the plate, R; and, lastly, the plate, N, over the latter. The plates, V and R, which serve to print lines only, have projecting blades on their upper face, whilst the plate, N, which serves to print lines, notes, and other musical signs, has also projecting blades, I, but likewise all the notes and other signs that are to be printed in black. It is evident that for printing at once all the said notes and lines they must rise all to the same level, so as to give a single printing surface. The lines and notes of the upper plate, N, project as much as in common stereotype plates, namely about three-sixteenths of an inch above the face of the plate; the blades of the plate, V,

should have the same elevation, namely, three-sixteenths of an inch, plus the thickness of the plate, N. Lastly, the blades of the plate, R, which are to print the red lines, should have an elevation equal to the thickness of both the plates, V and N, plus three-sixteenths of an inch. The three plates should be in close contact over one another and on the table, P, of the press, so as to resist the pressure without giving way; in order that the printing plates may be in close contact as required, and that their printing blades may rise to the same level the blades of the under plates should traverse the upper plates so as to have a same printing surface, as seen, fig. 6; for that purpose the upper plates should have long slots or mortices for the passage of the blades of the lower plates, which may be done by the ordinary well-known processes at the foundry. The lower plate, R, is entirely plain without mortices, it has blades only as already stated, the two upper ones alone have mortices. The three plates are intended each of them to print at once the different colour required for my system of music on the tri-coloured scale, as already stated, and as seen in fig. 2, which is a sample printed with the three plates together. Each one should have been inked separately with a different coloured ink; this can de done in several ways. I intend to use the plainer and quicker method of doing this operation; for instance, after printing a copy I take out the two upper plates, N and V, and put them on a separate table for inking them separately each one with its own colour, the first one black, the second green, and the plate, R, which remains on the table, P, is charged with red ink. These three plates being replaced over one another, a second proof is printed, and so on. In order that the plates may always be in the same precise position, there are four pegs, *t*, *t*, projecting from either the table, P, or the under plate, R, and the other plates have holes bored through corresponding to the pegs, *t*, so that when fitted no deviation of the printing position can take place. There are, however, various other methods of obtaining the same results which will naturally suggest themselves, but which need not be mentioned here.

What I claim more especially is,—

The composition and contrivance of the plates, N, V, and R, as they are represented, either together ready to work, as in fig. 1 and 6, or each one alone, as in figs. 3, 4, and

5, ready to be inked with different colours for printing the transpositive three-coloured musical scales as aforesaid.—In witness, &c.

LEWIS NORMANDY.

Specification of the Patent granted to GEORGE EDWARD DERING, *of Lockleys, in the County of Herts, for Improvements in Galvanic Batteries.*—Dated July 1, 1856.

To all to whom these presents shall come, &c., &c.—My first improvement consists in certain new exciting liquids for the negative element of those kinds of batteries in which nitric acid, or a mixture of nitric acid and sulphuric acid, has usually been employed to excite their negative element; and for this purpose I employ the liquids resulting from the addition of the salts, nitrate of potash, or nitrate of soda, or other suitable nitrate or nitrites, to sulphuric acid. I am aware that it has been proposed to employ similarly certain aqueous mixtures of these salts, or of some of them, with sulphuric acid, and I do not claim the use of such liquids; but my process consists, firstly, in placing the salts directly in contact with the acid, without previously dissolving them, and without the addition of water, unless in quantity not exceeding one-third of the whole; or, secondly, in mixing with the acid a solution of the salt in quantity not exceeding one-third of the whole; both of which plans I find to be attended with a more powerful evolution of electricity, and other important advantages.

My second improvement consists in the use of a mixture of nitric acid and hydrochloric acid, either with or without the addition of sulphuric acid or other acids, as an exciting liquid for the negative element of those kinds of batteries in which nitric acid, or a mixture of nitric acid and sulphuric acid, has usually been employed to excite their negative element.

My third improvement consists in certain methods of employing iron of any description, or alloys of iron and other metals, or unamalgamated zinc, as a positive element in batteries which have their negative element excited by nitric acid, or nitrous acid, or liquids containing nitric acid

or nitrous acid in any form. I am aware that it has been proposed to employ iron as a positive element in batteries of this kind; but its use has, I believe, been abandoned in consequence of the violent local action produced by the liquids employed to excite it. My plan consists in employing as the exciting liquid solutions of any suitable salts—such as, for instance, nitrate of potash, or nitrate of soda, or common salt; or mixtures of any suitable acids with water, the proportion of water being, in the case of mineral acids, not less than thirteen volumes to one; or liquids containing both acids and salts; or plain water, or sea water, or any other suitable weak liquids which have little or no local action upon iron or unamalgamated zinc; such liquids being separated by a porous division, or other suitable means, from the liquid in contact with the negative element of the battery. And a very cheap method of working batteries upon this principle consists in the use of borings, or turnings, or filings, or refuse scraps of iron or zinc, as the positive element,—the supply of which may be renewed periodically, in the same manner as fuel is added to the furnace of a steam boiler. Various methods may be adopted for establishing the necessary connexion with positive elements of this kind; but the plan which I prefer is, to plant in the midst of the scraps forming the positive element a stout wire or bar of the same metal, a coating of varnish or other means of protection being applied to it at about the surface of the liquid, and for a sufficient distance above and below. I prefer to employ carbon or cast-iron as the negative element of batteries having positive elements and their exciting liquids according to this third part of my invention, but various other materials, metals, or alloys of metals, may be employed; I would remark, however, that I lay no claim to such batteries if platinum be used as the negative element, as I am aware that somewhat similar proposals have before been made. And with regard to the term "unamalgamated zinc," in the description of this part of my invention, I would remark that I intend it to signify zinc unassociated with mercury; it may, however, have various other metals alloyed with it, and I claim the use of all or any such alloys, although not of zinc amalgamated with mercury.

My fourth improvement consists in forming the metals of batteries—whether they be flat plates or of any other form —thicker towards the upper part, and especially at about

the surface of the liquids, so as to compensate for the more rapid consumption which takes place at those parts. I am aware that it has been proposed to cast zinc plates for batteries after this plan, and I lay no claim to doing so; but the method which I find to be far superior in the case of zinc is, to bring it to the desired form by rolling.

My fifth improvement consists in applying a covering of gutta percha or other suitable material to the metals of batteries at about the surface of the liquid, and for a sufficient distance above and below it to prevent the destructive action which usually takes place there. I prefer for this purpose sheet gutta percha of about one-sixteenth of an inch in thickness, which I attach to the metal by any suitable cement impervious to the acid or other exciting liquid.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details of the description which I have given of my invention, as the mode of carrying out the same may be greatly varied;

But what I claim is,—

First, the use of the mixtures of acids and salts described, as an exciting liquid in galvanic batteries.

Secondly, the use of mixtures of nitric acid with hydrochloric acid, as an exciting liquid in galvanic batteries.

Thirdly, the use of iron or unamalgated zinc in the manner described, as a positive element in galvanic batteries.

Fourthly, the forming the metals of galvanic batteries thicker towards the upper part, as described.

Fifthly, the method described of protecting the metals of galvanic batteries at and about the surface of the liquid.—In witness, &c.

GEORGE EDWARD DERING.

Specification of the Patent granted to HENRICH LUDWIG BUFF, *of* 9, *Fitzroy-square, in the County of Middlesex, and* FREDERIC VERSMANN, *of* 3, *Forest-place, Kingsland-road, in the same County, Chemists, for An Improvement in Purifying and Softening Water.*—Dated June 25, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in purify-

ing and softening water, and consists in applying silicate of soda in combination with carbonate of soda, or other matter known to precipitate lime. For which purpose the silicate of soda, with the other precipitating agent, is to be introduced into the water and agitated; the water is then allowed to settle for some time, and, if desired, filtered.

And in order that our said invention may be most fully understood and readily carried into effect, we will proceed to describe the method in which to conduct the process.

In order to ascertain the proportions of silica (contained in the silicate of soda) and carbonate of soda (or other matter known to precipitate lime) which are required to soften and purify any description of water, it is necessary, in the first place, to determine the degree of hardness of the water by the test known as Dr. Clarke's, and also the number of grains of magnesia which a gallon of the water contains. These facts being ascertained, we proceed to add to each gallon of water 2·12 grains of anhydrous carbonate of soda for each degree of ascertained hardness, and 3·4 grains of silica for each grain of magnesia which the measure of water contains.

In carrying out the process on a large scale, the water should be contained in a reservoir; and the proper proportion of the two salts dissolved in water having been added, the water in the reservoir should be well agitated, to diffuse the solution through the whole mass of the water. After a few days, the precipitate formed in the water will have completely subsided, and the clear water may be drawn off for use, or, if necessary, it may be previously passed through a filter.

In using any other precipitant of lime in place of carbonate of soda, the quantities employed must be greater or less than the quantity of carbonate of soda, according as its combining equivalent is greater or less than that of carbonate of soda.—In witness, &c.

HENRICH LUDWIG BUFF.
FREDERIC VERSMANN.

Specification of the Patent granted to EDWARD CHARLES HEALEY, *of Sidmouth Lodge, Old Brompton, and* EDWARD ELLIS ALLEN, *of* 376, *Strand, for An Improvement in Preparing for use Veneers, Paper, and other Fabrics, or Sheets made of Fibres.*—Dated July 7, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in preparing for use veneers, card paper, or any sheets made of fibres, and consists in corrugating such veneers or sheets. The mode of operating upon veneers or sheets made of fibres varies with the nature of the wood from which the veneers are cut, and with the materials of which the sheets are made. In corrugating veneers different modes of operating may be practised, either separately or combined, according to the nature of the wood used.

In the first mode the veneers are covered, either on one side or both sides, with some woven fabric, such as canvas or cotton, which is glued or otherwise cemented to the veneers, and which has the property of preventing such veneers from splitting during the operation of corrugating them. The veneers when covered are subjected to the process of corrugating, which is done by passing them between corrugated rollers, such rollers having the corrugations cut in them in the direction of their lengths. Or, instead of employing rollers as above described, cast iron or other dies may be used having the corrugations formed in their faces. These dies are gradually brought together, and the veneer is subjected to severe pressure for some considerable time until the corrugations become permanently set. During these operations, either with the rollers or dies, the veneers are sometimes subjected to the action of high pressure steam, or they may be immersed in water kept at a high temperature, or instead of being immersed may be subjected to the action of a stream of hot water, or, lastly, may be simply kept at a high temperature without being in contact with either water or steam. It should be observed that in some cases when veneers are subjected to the action of high pressure steam, hot water, or are otherwise treated, that it is not necessary to cover such veneers with any woven fabric. On the other hand, we have corrugated veneers when simply covered with the fabric, and

without being submitted to the action of heat. The veneers when corrugated are stripped of the canvas or other covering on at least one side when such covering has been placed on both sides, and the surface of the veneer is then rendered smooth, and afterwards French polished or otherwise finished as desired. In corrugating sheets made of fibres, such as card paper, papier maché, or other like materials, the modes adopted vary with the material employed, as also with its thickness when finished.

Thin sheets for ornamental purposes may be corrugated by simply pressing them between corrugated rollers and subjecting the sheets to pressure whilst between such rollers, or they may be corrugated with dies instead of rollers. The sheets may be treated with steam or hot water, or the rolls or dies may be heated in order to facilitate the process, but this will not always be necessary where the sheets are thin, say one-thirty-second of an inch thick. In the formation of thicker sheets they may be made in moulds, similar to the ordinary method of forming plain papier maché sheets, only having the moulds with corrugated surfaces. The moulds may be of wood, iron, or other material, with a covering of fine wire gauze fixed thereto, the iron or wooden moulds having numerous openings formed in them for the purpose of giving free access to the water pressed from the pulp. When strong fibres are employed it may not be necessary to cover the moulds with wire gauze, that is, if they contain numerous small holes for the escape of the water in the pulp.

Instead of wire gauze fine perforated zinc may be used. Both the upper and lower dies should be perforated when the sheets are thick, so as to give the greatest facility for the escape of the water, but in medium sheets the lower die may alone be perforated.

After the sheets have been thus roughly formed, they are about one-sixth of the thickness of the layer of pulp out of which they are made, and they are then either separately or several of them together submitted to further pressure by which they are still further reduced in thickness, say to one-fourth or one-third, or from one-twentieth to one-thirtieth, of the thickness of the pulp and more water is pressed from them. The sheets are then in a compact mass and may be readily lifted about, but are yet capable of being impregnated with any matters desirable to render them water or fire-proof, or necessary in order to

give them a perfect finish. To these ends the sheets are treated similar to some of the papier maché sheets now made, videlicet, by soaking them in well-boiled oil until the oil has penetrated into the sheets, and which requires different times, according to the thickness of them and the density to which they have been pressed. It is also proposed at this or some preceding or subsequent stage of manufacture to submit the sheets to the action of alum water or a solution of chloride of zinc or other solutions which have the property of rendering the materials which contain them nearly or quite fireproof. The sheets may be either coated with one or two or three coats of these materials at any stage of their manufacture, which has been found to answer the purpose, or the alum water or solutions may be mixed or may constitute the fluid used in the formation of the pulp.

After the sheets are taken from the oil tanks they are subjected to a high temperature in a close oven which is maintained at between 200 and 300 degrees, where they are left from twenty to fifty hours, which has the effect of baking or drying the oil contained in them. It should be observed that the sheets, either previously or subsequently to being treated with the oil, are passed between polished corrugated rollers, heated or not, for the purpose of finally burnishing them and giving them a smooth and even face. The baking process above described may be omitted in the case of thin sheets, that is, when the finishing rollers are highly heated, as the oil or other matters will be sufficiently dried in the course of this process. It should be here observed that it is not considered essential to form the rough sheet in corrugated dies, as the same end may be accomplished by forming the rough sheets flat in the manner in which papier maché sheets are now made, and afterwards corrugating them by means of rollers or dies, or first using dies and finishing with rollers. It should also be stated that the application of heat may be made in any part of the process so as to facilitate the formation of the corrugations.

Another part of this invention has reference to the manufacture of papier maché sheets of two or more kinds or qualities of material, that is to say, one or both faces of the sheets are made of fine material for the sake of giving them a proper face, for which fine material is essential, and the central portion or all except one face is made of a

coarser material in order to diminish the cost of the sheets. For this purpose two tanks or vessels of pulp are prepared, and the moulds (whether flat or corrugated) are first partially filled with coarse pulp; they are then filled up with the finer pulp, and the operation proceeds as before, or of course; the fine pulp may be put in the moulds first, and the coarse afterwards, or if both faces are required to be finished, first fine pulp, then coarse, and then fine pulp again must be used. Further, it has been found to be possible to give the papier maché sheets a grain on the face by introducing on the surface of the pulp various coloured fibres or dusting-powdered material over it, either cloth dust or flock, such as that used in the preparation of paper, used as hanging, or powder of colouring matter. The surfaces may also be grained by brushing over the faces of the sheets after they are finished, or before finishing by using colouring matter or using rosewood or other wood stains by which we have succeeded in producing beautiful effects. The process of ornamenting or graining the surface of papier maché sheets avoids the necessity of painting them, which is now usual. This painting, sometimes extending to as many as twenty coats, and occupying seven weeks before completion.—In witness, &c.

EDWARD CHARLES HEALEY.
EDWARD ELLIS ALLEN.

Specification of the Patent granted to HENRY HUSSEY VIVIAN, BERNHARDT GUSTAV HERRMANN, *and* WILLIAM MORGAN, *all of the Haford Works, Swansea, in the County of Glamorgan, for Improvements in the Manufacture of Copper, and in obtaining Gold and Silver from the Ores employed in such Manufacture.*—Dated June 23, 1856.

To all to whom these presents shall come, &c., &c.—Our invention has chiefly reference to the treatment of metallic copper bottoms, derived from the well known smelting process of selecting or regule making up, to the production of which metallic bottoms we introduce no alteration in the smelting of copper ores, whether they be auriferous, argentiferous, or so allied with impurities as to

produce bottoms in the selecting process of greatly depreciated value when reduced to a marketable state.

Our invention is also applicable to the auriferous, argentiferous, or impure copper of commerce.

We now proceed to describe the method we adopt for dealing with such metallic bottoms or copper, which, whether derived from the tapping-beds or purchased, is in the state of pigs or blocks. We melt these pigs, or blocks, and tap the melted metal into cold water, of which a constant supply must be kept up, so as to cause the metal to assume the form known as feathered shot, and to facilitate the after process of calcination all large pieces should be picked out and remelted. We next calcine the metal in an ordinary calciner until the whole, or practically the whole, is converted into an oxide; that is to say, until it is susceptible of being pounded to dust in a mortar. We have found that an ordinary copper works calciner is capable of bringing three tons of copper into this state in seventy-two hours. We charge one ton and withdraw one ton each twenty-four hours, introducing it at the end of the calciner most remote from the fire, and advancing it each twenty-four hours towards the bridge; in the meantime, the granulated copper must be frequently stirred, so as to expose fresh surfaces, and a bright red heat must be kept up. The above is the process of oxidization, which we consider the best, but the metal may be otherwise oxidized if it be preferred.

Having converted the bottom or metallic copper into an oxide we next mix that oxide with a sulphurous material, and melt the mixture, so as to reduce it into a regulus of copper, we have mixed twenty-six cwt. of sulphurous copper ore (containing, say thirty per cent. of sulphur), with sixteen cwt. of oxide, and have converted the oxide of copper into a regulus (of about forty per cent.), we have also mixed the oxide with raw ore, furnace metal, and siliceous matter, and produced a like result. A small metallic bottom is usually produced in this process, which will be found to be rich in gold. It is quite possible to mix a smaller portion of sulphurous material, and thus to produce less regulus and more metallic copper or bottom, but we find it, in practice, to be better to reduce nearly the whole oxide of copper to regulus. We then advance the regulus by calcining and smelting, or by roasting up to "white metal" of about

seventy degrees, and submit this white metal to the selecting process so as to produce "light regule" and metallic bottoms.

From the ordinary furnace charge of two tons we have obtained thirty cwt. of regule, and five to six cwt. of bottoms, with a satisfactory result. These bottoms will be found to contain nearly all the gold contained in the copper or bottom originally operated on. If any sensible amount of gold remains in the regule a second selecting will remove it and concentrate it in the bottoms.

We have found that lead, arsenic, and antimony, are generally (collectively or separately) present in the auriferous copper bottoms, and that their presence materially facilitates the concentration of the gold in the bottoms; should neither of these be present we recommend the addition of lead in the shape of litharge or ore in the reducing of the oxide to a regulus. We then submit the metallic bottoms thus formed again and again to the process of granulation, oxidation, reduction to regulus, and concentration, by selecting until the gold exists in such a proportion to the copper as to render its separation by any of the well-known methods economical.

If the metallic bottom or copper should contain silver alone, we reduce it, as before described, by granulation, oxidation, and smelting with a sulphurous material, to a regulus. We are then enabled to submit it to the process in operation at our works, for which a patent was obtained by John Taylor, to extract the silver.

If the metallic bottoms or copper be both auriferous and argentiferous we treat the regule derived from each selecting process for silver by the above-named patent, and the bottoms as before described for gold. If any metallic bottom or copper be so alloyed with impurities as to render it of depreciated value, if reduced to a marketable form in the usual way, we granulate, oxidize, and reduce it to a regulus, and we are thus enabled to submit the copper, as frequently as we desire, to the selecting process, and thus to obtain from it copper of a superior quality.

Having thus described the nature of our invention, and the manner of performing the same, we would have it understood that what we claim is, the reducing metallic bottoms or copper to the state of regulus, and roasting and smelting the same so as to obtain metallic bottoms in which the gold is concentrated, and is further concentrated by

repeating the process, and by which process also a regulus of improved quality is obtained, which may conveniently be treated to separate silver, either by the process for which a patent was granted to John Taylor, or otherwise. We also claim the method herein described for producing a regulus from a metallic bottom or copper, viz., by converting the same into an oxide and fusing such oxide with a sulphur compound.—In witness, &c.

HENRY HUSSEY VIVIAN.
BERNHARDT GUSTAV HERRMANN.
WILLIAM MORGAN.

Specification of the Patent granted to WILLIAM PAPINEAU, *of Harrow-bridge, Stratford, Manufacturing Chemist, for An Improvement in the Production of Spirits of Wine.*— Dated July 19, 1856.

To all to whom these presents shall come, &c., &c.— This invention has for its object an improvement in the production of spirits of wine. For this purpose the starch of rice, or of grain, or of other matters containing starch, is first converted into sugar, as is well understood, and my improvement consists of distilling spirits of wine from fermented solutions of such sugar.

And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the process which I employ.

Heretofore in the manufacture of oxalic acid from rice, grain, and other matters containing starch, it has been common to convert the starch contained in these matters into sugar, and then to act on the sugar so obtained with nitric acid, so as to produce oxalic acid; and in order to effect this conversion of the starch into sugar, the rice, grain, or other matter, is without grinding, crushing, or other previous preparation, digested with dilute sulphuric acid until the desired change is effected. And it is the employment of this process in the manufacture of spirits of wine which is the essential feature of my invention. The process is conducted in the following manner:—

The grain, rice, sago, fecula, potato starch, or other matters to be operated upon, are introduced gradually into

a vat lined with lead, or into a copper vessel containing a mixture of water and sulphuric acid, in the proportion of 300 or 500 gallons of water, and 60 to 100 lbs. of acid to every ton of rice, sago, or potato starch, or a proportional less quantity of acid if cereals, roots, or other matters containing starch, be used in relation to the quantity of starch they contain; the acid solution being rapidly boiled and agitated during the operation by a steam blow pipe, with or without mechanical means. The rice, starch, and fecula will be rapidly dissolved, and after the whole is introduced and the solution completed, the vessels should be covered up, and the steam boiling continued for twenty-four hours, or until the saccharine property is fully developed. A quantity of fresh burnt animal charcoal is then to be introduced, and the whole boiled together for two or three hours longer, when a sufficient quantity of carbonate of lime (whiting) is to be added to neutralize the acid, and the whole drawn off on a filter so arranged that the filtration shall run into proper tanks; fresh portions of boiling water are to be run on the filter till the saccharine matter is extracted, and the washings added to the first runnings. The whole may then be run into the mash tun (at a proper temperature), and used to mash a quantity of malt or grain, equal to one-quarter or one-sixth of the starch, or starch yielding matter used (which I prefer), or the saccharine solution may be diluted and cooled to the proper temperature and fermented at once, *per se*, in the usual way; and I prefer to use a Coffey's still in both cases for the distillation.—In witness, &c.

WILLIAM PAPINEAU.

Specification of the Patent granted to HIRAM HYDE, *of Truro, Nova Scotia, Gentleman, for An Improved Mode of Purifying Alcohol or Alcoholic Spirits.*—Dated December 18, 1855.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention relates to the destruction by chemical means of the fusil oil and odorous oils found present in alcohol and alcoholic spirits. These oils, derived from the various matters which have been fermented in obtaining the alcohol and alcoholic spirits, are more or less abundant

in such manufacture, and are distinctive of the source from which each kind of alcohol or spirit was obtained. The principal oil has long been known by the name of fusil oil or amylic alcohol, which is also mixed with other bodies, such as acetic and butyric acid and ammonia, forming compounds more or less volatile; besides these compounds, there are present in some alcoholic spirits volatile oils, which are fragrant, and give names to the spirits. These oils interfere with the uses of alcohol for many purposes; thus, in the preparation of chloroform, alcohol being used which contains fusil oil, there are a variety of products formed having this oil as their basis, existing as ethers, mixed with the chloroform, rendering it unpleasant or dangerous in its most important application.

In the preparation of perfumes, alcohol containing fusil oil cannot be used as a solvent, from the action which the oil and its compounds exert on the essential oils used to give delicate odours. More generally for officinal use ordinary alcohol confers a repulsive odour when used for preparing tinctures and extracts. I am aware that alcohol has been partially purified by distillation, and the use of charcoal and hypochlorate of lime (Ca. O + Cl. O), but the best samples contain notable proportions of fusil oil and ethers.

This invention is founded on the oxidating power exerted by manganic acid and permanganic acid on the oils and ethers found in alcohol. The inventor, in carrying out his purifying process, takes of finely ground oxide of manganese three pounds, nitrate of potash or nitrate of soda five pounds, in a state of mixture, and slowly melts them in a crucible, continuing the heat until the melted mass passes from a fluid to a stiff pasty mass. When cold, the mass must be powdered and kept dry for future use. It contains manganate of potash or soda, or gives permanganate of these bases with excess of potash or soda and earthy impurities. Manganates and permanganates, however obtained, may be used instead of the crude compound thus formed. In either case these agents will be found to act upon and rapidly destroy the oils present in common alcohol and alcoholic spirits, forming valerianic and other acids, which unite to the base of the manganate used, and may be removed. For every gallon of alcohol of eighty-five or ninety per cent., the inventor uses two ounces of the manganic compound, dissolved in eight ounces of water,

and he adds the solution to the alcohol while the whole is briskly agitated. This proportion is the average quantity required for common alcohol, but so much should be used as is sufficient to destroy the odour of the fusil oil, and the purified alcohol must then be distilled by gentle heat from the matters dissolved and suspended in it. In purifying alcoholic spirits of proof strength, such as rum, whiskey, &c., the fine powder of the manganic compound is added in successive portions, and the whole is rapidly agitated until the odour of the fusil oil disappears, the purified spirit is then distilled. The manganic and permanganic acids, although combined with strong bases, are decomposed by the fusil and other oils, even when a great excess of alcohol is present. Pure alcohol is, on the contrary, slowly changed into acetic acid, and should an excess of the manganic compound be used, acetic acid would be produced, with loss of alcohol. The valerianic, butyric, and acetic acids produced and previously existing are left after the distillation combined with the potash or soda.

Having now set forth the nature of the invention of "An Improved Mode of Purifying Alcohol or Alcoholic Spirits," as communicated to me by my foreign correspondent, I wish it to be understood that under the above in part recited letters patent, I claim the use of the manganates and permanganates existing as soluble compounds, however obtained, for purifying alcohol, so as to adapt it to nice purposes.—In witness, &c.

HIRAM HYDE.

Specification of the Patent granted to EDWARD DAVIES *and* JOHN MILNE SYERS, *both of Liverpool, in the County of Lancaster, and* CHARLES HUMFREY, *of Camberwell, in the County of Surrey, Merchants, for Improvements in Distilling Resinous, Bituminous, Fatty, and Oily Matters, and in the Treatment of certain Products therefrom.*— Dated December 18, 1855.

To all to whom these presents shall come, &c., &c.— Our improvements in distillation are as follows:—In distilled resinous, bituminous, oily, and fatty matters, it is desirable to obtain, first, a means of easily regulating the heat in the still, raising it or lowering it at pleasure; and,

secondly, the separation of the still and its inflammable contents from the furnace required to heat it.

Now, we propose to attain these objects by the following contrivance:—The still is one of the ordinary form, into the bottom of which we introduce a coil of iron or copper pipe, entering at the side and passing out at the centre of the bottom or otherwise, as may be found most convenient.

The furnace, placed at a lower level and at some distance from the still, has also a coil of pipe placed in it. The two ends of the two coils are connected, and the tube filled with some fluid or substance capable of sustaining a high degree of heat. For this purpose we prefer to use fusible metal, which, being heated in the furnace, will circulate rapidly through the two coils of pipes, and transfer to the charge in the still any required degree of heat.

Should it be inconvenient to arrange the furnace in which the coil of pipe is heated at a lower level than the still, the circulation of the heated metal or other heating medium can be effected by introducing into the pipe connecting the two coils a spiral fanner, and this being made to rotate by any convenient machinery will cause the heated metal to circulate through the apparatus, and by adjusting the speed of this fanner the heat transferred from the furnace to the still can be adjusted. If fusible metal is used as the heating medium it will be requisite to have the facility of emptying the coil when the still is out of action, and filling it again when required for use, but this is so easily done that we do not consider it requisite to specify any particular mode of doing it. The flow of the heating medium can be regulated by a stop-cock or valve.

We will now proceed to describe the methods we employ to free paraffine from oil and colouring matter. We first subject the rough paraffine to pressure in an ordinary hydraulic or other press, by which means the greater portion of the oil will be separated from it; we then boil the pressed cakes with free steam, and towards the close of the operation add about one per cent. of their weight of ordinary sulphuric acid, and continue the ebullition a short time. This will throw down all the dirt and mechanical impurities; and as soon as these have settled, we draw off the paraffine into any convenient vessel, and add to it about one-fourth of its weight of naphtha, and stir them well together. This vessel should be covered closely to

avoid the loss of naphtha. When this mixed paraffine and naphtha has cooled down to about 130 degrees Fahrenheit, we draw it off into tins, such as those used in the stearine manufacture, and allow it to cool. We press the cakes thus obtained between coir mats or otherwise, as in pressing stearine, when the naphtha runs out freely, carrying with it the oil and pitch with which the paraffine was contaminated. By repeating the process and using fresh naphtha the paraffine can be obtained of perfect whiteness, and we find that even the darker samples of Irish and Prussian paraffine can be made white by three such operations. The naphtha used in the third operation will be scarcely discoloured, and will serve for the second, and that used in the second for the first, but it will then have become so charged with oil and pitch as to be unfit for further use, and must be returned into the still and worked over again; thus no loss will arise. The paraffine from the last pressing will always retain a slight trace of naphtha, from which it can be easily freed, by heating it to about 250 degrees Fahrenheit, and blowing steam through it. In thus purifying paraffine we prefer to use the naphtha that has been obtained in distilling the paraffine itself; thus, the naphtha obtained from Rangoon tar is the best to refine the paraffine obtained from that same material, as when it becomes charged with oil and pitch it can very conveniently be returned into the still and worked over again. This, however, is not essential, and any naphtha or other spirit can be used to refine any paraffine; we find rosin spirit very well adapted to this purpose.

Having now described the nature of our said invention, and the manner in which the same is to be performed, we hereby declare that we do not confine ourselves to the precise details, nor to the exact materials used;—

But we claim as the invention intended to be secured by the said letters patent, the distilling resinous, bituminous, fatty, and oily matters, and the purification of paraffine, as above described.—In witness, &c.

EDWARD DAVIES.
JOHN MILNE SYERS.
CHARLES HUMFREY.

Specification of the Patent granted to Lemuel D. Owen, *of Southampton-street, London, in the County of Middlesex, Engineer, for Improvements in the Manufacture of Artificial Stone.*—Dated May 28, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—The said invention consists in forming blocks of artificial stone, for building purposes, as a substitute for bricks and stones. The bases of this improved building block are lime and silicious sand, articles which are old and well-known materials for building purposes, and which have been used in a great variety of relative proportions, either as mortar to cement stones or bricks together, as concrete to make foundations, or for other purposes. But this invention is clearly distinguishable from all these; for although it is composed of such old and well-known material, yet these materials are so combined as to give to the block new properties and advantages essentially different from those possessed by any other known artificial building material.

The manner in which these new building blocks are formed, is as follows:—A quantity of coarse silicious sand, as free as possible from admixture with clay or other earth is provided, together with a quantity of freshly slacked lime in powder. As much sand and lime as can be moulded into blocks during an hour are then to be thoroughly mixed together, in the proportion of about one part of lime to from six to twelve parts of sand, according to the nature of the sand or the quality of the lime, the lime being the dry powder hydrate produced when lumps of calcined limestone are freshly slacked, and the sand having that degree of moisture it ordinarily has when dug out of the earth. If preferred, the calcined limestone may be ground and mixed with the sand previous to being slacked, and then as much water added as is necessary for the process of slacking; this composition is then placed into the mould, of the required shape of a moulding press, similar to those used for making bricks from pulverulent clay, and is there submitted to great pressure, which should be proportioned to the thickness of the block required. A suitable pressure for a block of three inches thick would be about three tons to the square inch; blocks may be formed under less pressure,

but it is evident that the compactness of the block increases with the pressure to a certain extent. After the block has been submitted to this pressure, it is carefully removed from the mould and laid upon a flat surface, with free access of air, where it should remain until sufficiently hardened or ripened, when it will be ready for use. For the purpose of facilitating the ripening of the block, it should, if larger than a common brick, be perforated with one or more holes; these will admit the atmospheric air into the interior of the block, whereby the hydrate of lime will be converted into carbonate, a change which, if the blocks were large and solid, would require a considerable time.

The particles of sand in the composition are, by the heavy pressure to which it is subjected, forced into such close proximity, that it requires but very little cement to fill the interstices and agglomerate them together into a block of compact sandstone. The blocks thus made become indurated after a few months to such a degree that they are not readily distinguishable from natural sandstone. In the preparation of this material care must be taken not to employ wet sand, because if there is an excess of moisture, to such a degree as to exude water whilst the block is pressed, it would be impossible to give to the mass the requisite solidity, as the cohesion of the water to the sand and lime is so strong, and its incompressibility so great, that it could not be expressed in the very brief space of time during which the block is exposed to pressure. This excess of water would afterwards evaporate, leaving the block comparatively porous, light, and friable; it also would be much longer in hardening, crack in drying, and not maintain its shape. When sand is not readily obtainable, coarsely pulverized scoria from furnaces, bricks, or other pulverulent silicious matter may be employed in place of the sand; the lime and sand may be mixed with oxides of metal, or other colouring matter, to give the blocks any desired colour. These blocks dry without shrinking or warping, and hence possess great advantages over bricks, which always shrink much and very unequally, and also warp in burning. Blocks may be made in any desirable form or shape, plain or ornamental, perforated or solid. For blocks intended for building in water, waterlime is used. These blocks are made in a similar manner to those above described, but when removed from the press and sufficiently set, it is well to submerge them in water for a

time, by which means they will rapidly grow hard and fit for use.

Having now described the nature of the invention which has been communicated to me, I would have it understood that what I claim, as the invention secured to me by the hereinbefore in part recited letters patent, is the manufacture of blocks of artificial stone from sand or other pulverulent silicious matter in combination with lime, and formed in moulds under great pressure, as hereinbefore described. —In witness, &c.

LEMUEL D. OWEN.

Specification of the Patent granted to WILLIAM ILLINGWORTH, *of Manchester, in the County of Lancaster, Gentleman, for Certain Improvements in Printing or Colouring and Glazing China, Earthenware, or other Ceramic Manufactures, and in the Machinery or Apparatus connected therewith, and also Improvements in the subsequent Treatment of such Manufactures.*—Dated May 24, 1856.

To all to whom these presents shall come, &c., &c.— First, my invention applies to the printing or colouring and glazing of pottery, and is an extension or improvement in the use of the preparation of saccharine matter, as a substitute for oil or other matters now in use, in the preparing of the colours for printing, for which I have obtained Her Majesty's letters patent, bearing date the 1st of October, 1855. My present improvement consists in the preparation and use of certain animal and vegetable mucilaginous or amylacious substances, as abumen, gelatine, gluten, casine, carrageen moss, linseed, mucilage, dextrine, gum arabic, gum adragant or tragacanth, and all other animal and vegetable mucilaginous or amylacious substances; also the use of deliquescent salts and other substances, such as the chlorides, nitrates, acetates, citrates, tartrates, saccharates, &c., &c., of zinc, manganese, lime, magnesia, &c.; also citric acid or lemon juice, secharic acid, phosphoric acid, arsenic acid, muriatic acid, together with all other deliquescent acids, either with or without saccharine matter.

Secondly, my invention, as applied to the machinery or

apparatus connected with printing pottery, consists in the application, employment, or use of "doctors" in connexion with the flat plates used for printing, for the purpose of cleaning such plates, in a similar manner to those in operation in cylinder calico printing, and also, if preferred, in combinatian with the use of inking or colouring rollers for furnishing the said flat plates.

Thirdly, my invention, as applied to the subsequent treatment of pottery, consists in the removal of the paper which conveys the impression from the ware, by the application of diluted chlorides or acids to the back of the paper, or by dipping the ware in water, or in water mixed with a little mucilage, chloride, or acid. It also consists in balancing or equalizing the power of suction or absorption of the glaze in the body of the ware with those parts which are printed upon, which might otherwise be unequal, and of course detrimental to the perfection of the glaze. This I accomplish by dipping or immersing the newly-printed ware into water, or water mixed with a little mucilage, chloride, or acid.

Lastly, my invention applies to the glaze employed, the ordinary composition of which I improve by the introduction or admixture of mucilage.

The pigment or conveying medium.—Any and all of the afore-mentioned mucilaginous substances and chemicals may be used in different combinations as a conveying medium for any or all of the metallic oxides or colour used for printing upon earthenware, china, or other ceramic manufactory. I prefer the use of gum tragacanth in combination with the chloride of zinc and a little carbonate of potash. Take in proportion one pound of gum tragacanth, cleansed from all grit and well powdered, and add about three quarts or five pints of concentrated chloride of zinc and about one ounce of carbonate of potash or red ash; mix them well together, and let the mixture stand for a day or two, then add the metallic oxide or colour and grind them well together; great care must be taken to have the colour well mixed and all the substances thoroughly amalgamated. If the colour dry too soon or stick too tenaciously to the paper, a little more chloride must be added; if not sufficiently adhesive, a little more gum or of potash. It is best for the colour to be mixed a day before use.

Taking impressions.—The paper must be previously

sized with a little gum water, or albumen mixed with water, and a little chloride of zinc to make it damp and supple. I prefer the paper being first steeped in diluted chloride of zinc or lime and then sized with the above, or a little milk mixed with chloride of zinc. In taking impressions from the copper plate, a sheet of vulcanized india-rubber must be used upon the flannel covering of the cylinder to insure good impressions; the impressure must then be conveyed in the usual way to the ware and rubbed with a piece of flannel.

My invention, as applied to the machinery, consists in the copper-plate being placed upon a moveable table or carriage. The "doctor" is placed in a fixed position, regulated by screws and springs, and worked by means of a lever, which machinery may or may not be used with other parts of this invention.

My invention, as applied to the subsequent treatment of pottery, consists in the removal of the paper from the ware, which may be done by the application of diluted chlorides or acids to the back of the paper, or by dipping the ware in water, or in water mixed with a little mucilage, chloride, or acid. I prefer a little diluted chloride of zinc or carbonate of potash applied to the back of the paper by a soft brush, and then the paper taken off. When a variegated or marble shading is required on the ground work of the print, a strong solution of acid, such as muriatic acid, &c., must be applied to the back of the paper. It consists also in balancing or equalizing the power of suction or absorption of the glaze in the body of the ware with those parts which are printed upon, which might otherwise be unequal (if not prepared against), and of course be detrimental to the perfection of the glaze. This I accomplish by dipping or immersing the ware, before or after being printed, into water, or water mixed with a little mucilage or acid, or both. I prefer dipping, after printing, in water with a little acid or chloride, or, in lieu, placed in an exhausting chamber after being printed. This part of the invention may or may not be used in connexion with any previously mentioned portion of my invention, but it tends to improve the appearance of ware when finished.

My invention, as applied to the glaze, the ordinary composition of which I improve by the introduction or admixture of mucilage, which may or not be used in connexion

with other parts of my invention: add to the ordinary glaze about one pint of carrageen mucilage diluted to about two gallons of glaze, or about one quarter of an ounce of gum tragacanth mixed with one quart of water. I prefer half an ounce of more solid gum to the above proportion of glaze. This first part of this invention, namely, the pigment or conveying medium, applies to the printing of earthenware in the different stages of manufacture, namely, either before or after its biscuit state; and the ware, when printed, may or may not be fired in the "hardening-on" kiln; if fired, much less heat and time are required than the present mode, and all risk of injury to colour avoided. In this case it is not necessary to take off the paper from the ware. If the hardening-on kiln is dispensed with, then the process, as described, must be adopted.

Having thus described the nature of my said invention, and the manner in which it may be carried into practical effect, I desire it to be understood that I claim the substitution or use of certain animal and vegetable mucilaginous or amylacious substances, as albumen, gelatine, gluten, casine, carrageen moss, linseed, mucilage, dextrine, gum arabic, gum adragant or tragacanth, and all other animal and vegetable mucilaginous or amylacious substances; also the use of deliquescent salts and other substances, such as chlorides, nitrates, acitates, citrates, tartrates, saccharates, &c., &c., of zinc, manganese, lime, magnesia, &c.; also citric acid or lemon juice, scharic acid, phosphoric acid, arsenic acid, muriatic acid, together with other deliquescent acids, and their different combinations, either with or without saccharine matter, in lieu or in place of oil, tar, &c., as hitherto employed in the pigment or conveying medium of metallic oxides or colour used in printing earthenware, china, and other ceramic manufactures, and all other portions of this invention, as herein particularly described and set forth.—In witness, &c.

WILLIAM ILLINGWORTH.

Specification of the Patent granted to Etienne Laporte, *Chemist, of Paris, in the French Empire, for The Application of certain New Materials in the Manufacture of Bougies, Candles, and other similar Articles.*—Dated April 1, 1856.

To all to whom these presents shall come, &c., &c.—I employ certain oleaginous grains or seeds, one of which is found at Gabon, on the western coast of Africa, and is called dikha, and the other is found in Brazil, and is called viro!a selifera, a tree of the family of myristicris, which is also found in Guyana and in Cayenne. These grains are of an oval form, and somewhat resemble nuts in taste. I take a quantity of either of the aforesaid grains, or a mixture of the two, and grind them down into a paste, which is spread upon a thin sheet of iron, or zinc, or other suitable material, and heated by a fire, or by steam, or otherwise, and stirred during the operation until it appears to become moist. About five minutes after the material has reached this stage, it is placed in woollen bags and between hair cloths or mats, and forcibly pressed; the oil runs out and immediately solidifies on cooling, and becomes hard like wax and of a brownish colour. In this state it would not be well fitted for the manufacture of the aforesaid articles; it is therefore submitted to a bleaching and purifying process. For this purpose it is placed in a pan or boiler heated by a fire, and mixed with twenty per cent. of its weight of a solution of chlorine or a mixture of chloride of lime and water, or a solution of caustic soda, or a solution of chromate of potash, or other of the substances used for bleaching oils and fats. The mixture of the waxy matter with chloride of lime is boiled for an hour or two, and constantly agitated. The completion of this part of the operation is indicated by the water separating from the mucilage and acquiring a rose colour approaching to violet; it is then allowed to cool. The product which swims upon the surface of the rose-coloured water is hard, sopy and white; it is broken up and replaced in the boiler with the addition of about forty per cent. of its weight of a mixture of sulphuric acid, with twice its volume of water. The mixture is boiled for an hour or more, and the soap is thus decomposed by the acid. The fatty or waxy matter is thus sepa-

rated, and on cooling it floats on the surface of the water, and is then nearly colourless; it is rendered still whiter by boiling it with a large quantity of water, skimming it, and allowing it to cool slowly, so that the last impurities may subside. The bleaching may also be effected by repeatedly exposing the fatty matter to the fumes of burning sulphur by placing it in a broken or powdered state upon a cloth under which sulphur is burned. It may also be bleached by exposure to the air out of doors in the state of thin sheets or powder spread upon a cloth. It should be frequently stirred and watered from time to time, and should be removed about two hours after the appearance of the sun. This operation may be repeated three or four times or oftener, until the matter is sufficiently bleached. The material prepared by any of these processes is fit for the manufacture of bougies, candles, and other similar articles. The aforesaid raw materials yield about forty per cent. more or less of bleached material. For the manufacture of bougies or candles which do not require snuffing, I employ flatted wicks prepared in the following manner:— To one gallon of water I add twenty-three drops of sulphuric acid and a quarter of a pound of boracic acid; this mixture is boiled, and after removing it from the fire the wicks are immersed in it for twenty-four hours and then removed and dried. The candles or bougies are then cast in moulds in the ordinary manner; the moulds may be heated or they may be cold. For a commoner description of candle requiring snuffing, the wicks may be round and of ordinary bleached cotton threads. From fifty to seventy-five threads may be employed, and it is preferable to employ a large number of fine threads rather than a smaller number of thicker threads; or the wicks may be similar to those of ordinary tallow candles. For manufacturing allumettes and wax wicks for floating or night lights and similar purposes, the waxy or fatty matter is melted in a pan heated by a fire or by steam. On one side of the pan and about a yard from it is placed a box divided into compartments, in each of which is a ball of the cotton wick, which may consist of four or five threads. The ends pass through holes in the box and descend into the pan, and pass through a ring fixed below the surface of the melted matter, but at a sufficient distance from the bottom of the pan to keep the wicks away from any impurities which may subside to the bottom. The wicks are then conducted up from the pan and through

holes in a metallic plate, or through glass eyes or tubes fixed in a frame, and the ends of the wicks are attached to a wooden drum or cylinder, from two to four feet diameter, and placed at a distance of four to five yards from the pan; this distance is for the purpose of allowing the melted matter to cool and solidify before reaching the drum. By turning the drum upon its axis, the wicks are drawn through the melted matter and wound up upon the drum; they are afterwards cut to the required lengths. The fatty or waxy material may be coloured yellow by turmeric, rose colour by alkanet or canette, blue by ultramarine, red by vermillion, and of other colours by the colouring materials usually employed for colouring fatty matters. The fatty material may also be mixed with tallow, stearic acid, wax, oils, and with other fatty matters generally.

Having now described the nature of my said invention, and in what manner the same is to be performed, I wish it to be understood that what I claim is,—

The application of the new materials hereinbefore mentioned in the manufacture of bougies, candles, and other similar articles, as hereinbefore described.—In witness, &c.

ETIENNE LAPORTE.

Specification of the Patent granted to ROBERT ROYDS, *of Southampton, in the County of Hants, Engineer, for An Improvement or Improvements in the Manufacture of Soap.* —Dated May 7, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in incorporating with the ingredients ordinarily employed in the manufacture of soap, gelatine and gelatinous substances, with or without borax. I proceed as follows:—

To the ingredients generally used in the manufacture of soap, such as tallow, or animal, vegetable, or fish oil, boiled in a ley of soda ash, at a strength of from ten to thirty degrees Beaumé, with or without resin, or to any other ingredients applicable to the manufacture of soap, and while they are in a hot state, I add from twenty to thirty per cent., more or less, of gelatine in a liquid state, and at a temperature of about ninety-two degrees Fahrenheit, more or less, and stir

the mass until the ingredients have become thoroughly intermixed. Sometimes in addition to the liquid gelatine I stir in from ten to fifteen per cent. of borax.

Although I find it preferable to stir in the gelatine to the ingredients while both are in a heated state, I do not limit myself to operating in such manner, as some manufacturers might add the gelatine before the other soap-forming materials were heated.

And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that I claim, as my improvement in the manufacture of soap, the incorporating of gelatine with any and all of the ingredients which have been or may be employed in such manufacture.—In witness, &c.

ROBERT ROYDS.

Specification of the Patent granted to WILLIAM THISTLETHWAITE, *of* 2, *Verulam-buildings, Gray's-inn, London, Gentleman, for Certain Improvements in Photography.*—Dated May 16, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention consists in producing and fixing photographic pictures upon all kinds of fabrics and materials. I compose a collodion very thick, consisting of sulphuric ether (of sixty degrees centigrade) 100 parts; alcohol (of thirty degrees centigrade) twenty-five parts; gun cotton, three parts; iodide of ammoniac, two parts; and to make the collodion more sensible I mix with it a solution of alcohol (of forty degrees centigrade) 6,000 parts; iodide of ammoniac, 325 parts; bromide of ammoniac, eighty parts. This composition is what is termed the pedicle, and which I pour upon a glass and afterwards plunge into a solution of distilled water, 100 parts, and crystallized nitrate of silver, eight parts. The plate is then ready to receive the photographic likeness or image, and after it is obtained it is introduced into a bath composed of distilled water, 1,000 parts; protosulphate of iron, 150 parts; acetic acid crystallized, twenty parts; and sulphuric acid, four parts. To fix the positive likeness or image it is plunged into a bath of distilled water, 500 parts, and cyanide of potassium, eight parts. The proof is then dried, and the pedicle may

be separated from the glass with a piece of blotting paper and placed upon the necessary material, and passed under a roller or rollers so as to well fix it upon the material; and after the blotting paper is removed, spirits of wine (of sixty degrees centigrade) is poured upon the likeness or image to give it the required tone and brilliancy.

The above mode of separating the pedicle gives an inverted likeness or image, but to non-invert the picture I can use the above or any other collodion thickened by a little gun cotton; and after obtaining the negative and positive proofs, I plunge the glass into a bath composed of 100 grammes distilled water and twenty drops hydrochloric acid. This bath will detach the pedicle from the glass by raising one corner of the collodion with the finger to allow the solution to penetrate gradually between the pedicle and the glass. The pedicle by this means floats upon the top of the glass and is ready to be transferred, and which is accomplished in the following manner:—The image is taken carefully out of the bath (still upon the glass), taking care to keep the thumb on a corner of the pedicle, after which a little water is poured over it. The glass is then laid down on a flat surface, and the fabric or material is placed upon it. The three objects (the glass, the pedicle, and the fabric or material) are taken up, the glass uppermost, and I press the fabric underneath it with the fingers to force out all air bubbles. The fabric or material, with the pedicle thereon, is then removed from the glass, and I pour water over it, and dry the picture over a spirit lamp or before a fire. When completely dry, I moisten the surface with spittle or water, and rub it well with the fingers or a handkerchief, cleansing the image of all imperfections and fogs. The colouring may in either operation be accomplished in the usual manner with moist or dry colours. This last mode of removing the pedicle from the glass I recommend, and which I prefer.

Having thus fully described the particulars and nature of the said invention, it must be understood that I do not confine myself to any peculiar collodion; but what I claim is, producing and fixing photographic pictures upon all kinds of fabrics and materials substantially, in the manner herein fully described.—In witness, &c.

WILLIAM THISTLETHWAITE.

Specification of the Patent granted to ALFRED VINCENT NEWTON, *of* 66, *Chancery-lane, in the County of Middlesex, Mechanical Draughtsman, for An Improved Mode of Preparing the Double Chlorides of Aluminium and Sodium and Aluminium and Potassium.*—Dated May 20, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—Hitherto, in order to obtain the double chloride of aluminium and sodium or of aluminium and potassium, anhydrous chloride of aluminium, obtained separately, was made to react upon a suitable proportion of chloride of sodium or of potassium; now, the object of the present invention, as communicated to me by my foreign correspondents, is to simplify the process, and to obtain directly and by a single operation the double chloride, which is intended to be employed in the production of aluminium, or for any other purpose to which it may be applicable. The mode of proceeding for this purpose is as follows:—The alumina or aluminiferous substance, having been reduced to powder, is first intimately mixed with an equivalent proportion of sea-salt or chloride of potassium; to this mixture is then added either charcoal, small coal, or any substance which is readily decomposed by heat, such as tar, pitch, bitumen, or any resin, or mineral or vegetable oil, &c., the proportion being varied according to the nature of the matter employed, in such manner that there may remain in the mixture a sufficient quantity of carbon for the reaction. The whole is heated in a closed vessel until completely calcined; the calcined mixture is then introduced into a distillatory apparatus suitable for producing the simple anhydrous chloride, heat is applied thereto, and dry chlorine is passed through it. When the temperature is sufficiently high, the chlorine will produce a reaction, and the double chloride will be distilled over and received into a close vessel in a liquid form; or, instead of chlorine, hydrochloric acid gas may be employed.

Pure alumina, produced by the calcination of alum or sulphate of alumina, may be employed; or impure alumina, argils, such as pipe-clay, or grey argil, kaolin; or, in a word, any aluminous substance.

When the aluminiferous substance employed contains a

large per centage of iron, and it becomes necessary from that circumstance to purify it, the aluminiferous substance is to be mixed with any of the carbonaceous matters above mentioned and then calcined. The iron is thus reduced to the metallic state, and may then be readily removed by treating the calcined product with an acid more or less diluted; after which the mixture is washed and dried, and is then fit for the production of the double chlorides, as before mentioned.

Having now described the invention as communicated to me by my foreign correspondents, I desire it to be understood that what I claim under the above in part recited letters patent is, the production of the double chlorides of aluminium and sodium, and of aluminium and potassium, by the process above set forth.—In witness, &c.

ALFRED VINCENT NEWTON.

Specification of the Patent granted to ALEXANDRE HENRI DUFRESNE, *of* 39, *Rue de l'Echiquier, Paris, in the Empire of France, and of* 4, *South-street, Finsbury, London, for An Improved Process of Gilding and Ornamenting Steel and other Metals.*—Dated May 21, 1856.

To all to whom these presents shall come, &c., &c.—My invention relates to the gilding, silvering, and ornamenting of metals not susceptible of direct amalgamation; and consists, first, in the employment of one or several intermediate metals, deposited either by chemical, electro-chemical, or mechanical processes, on the metal to be gilded, silvered, or ornamented.

Secondly, in the manual or mechanical application of a protecting matter, such as varnish, bitumen of Judæa, printers' ink, &c., upon the intermediate metals, to form the reserves to be gilded, silvered, or ornamented, such reserves being produced by photographic means, or by a general coating sensible to light, such as bitumen of Judæa.

Thirdly, in the destruction of the intermediate unreserved metals, by baths of different kinds, such as ammoniacal or acid solutions, applied so as to preserve the polish, or to act on the surface of the metal to be gilded, silvered, or ornamented, for the production of flat and relievo designs.

Fourthly, in the removal of the protecting matters which have served to preserve the surfaces operated on.

Fifthly, in gilding or silvering the surfaces by means of mercury, according to the ordinary processes of gilding and silvering by amalgamation, and finally the volatilisation of the mercury by heat.

Having thus described the nature of the invention, I will now proceed to describe the mode of carrying it into effect, premising that the working details may be modified according to the metals on which the deposit is to be effected, and other varying circumstances.

To operate on iron or steel, a coating of copper is deposited on one of these metals selected, which is then gilded or silvered by the ordinary processes of amalgamation, if it is intended to cover the entire surface. To decorate or damaskeen either of these metals with designs in gold or silver on the iron or steel grounds, or *vice versâ* :—I cover entirely the metal to be operated upon with a coating of copper by the ordinary means. On the copper surface thus prepared I form the required design by means of varnish, bitumen of Judæa, or other suitable protecting substances, and then immerse the article in a bath of chromic acid, which dissolves the portions of the copper unprotected by the varnish, leaving intact the surface of the iron or steel. The varnish is then removed by means of a hot turpentine, exposing thus a design in copper on the iron or steel ground. The article is then finished off and the gilding or ornamenting of the design effected, the mercury being volatilised by heat after the amalgamation in the ordinary way.

To operate on platina, I cover entirely with copper the article to be ornamented, and then form the design, as before stated. The unprotected parts of the copper are then dissolved out by nitric, sulphuric, chromic, or other suitable acid, and the varnish being removed, I gild or ornament by amalganation as for iron.

To operate on silver, the processes are in this case modified, as follows:—I deposit on the silver surface a triple metallic coating thus: first, copper; second, iron; third, a second surface of copper. I form the reserves on this last coat of copper, and then destroy in succession the unreserved parts of the superposed metals, so that the iron which presents itself, on removal of the upper coat, prevents the mercury from adhering to the first copper or silver surface during the amalgamation. The iron is lastly re-

moved by any suitable re-agent. The object of interposing the iron between the two copper surfaces is to facilitate and shorten the operation, by limiting the employment of the reserves to the surfaces to be gilded or ornamented. (By the present mode of operation the entire ground is protected.) This object is effectually attained by the agency of chromic acid, which readily dissolves the copper without affecting the iron surface to the slightest extent. Instead of interposing an iron coating between two coats of copper, I can employ, and in most cases more advantageously, a surface of nickel or antimony, which are readily acted on by chromic acid. In this case I remove the last surface of copper by an ammoniacal solution, which has the advantage of leaving the silver untouched. These intermediate metals may, however, vary according to circumstances. Instead of forming the reserves by the hand by means of protective varnishes, I can employ the ordinary processes of photography, heliography, or impression, either directly or by transfer on the surface to be gilded, silvered, or ornamented, and am thus able to reproduce in the metallic state the most complicated arabesques and designs.

Having now described the nature of my said invention, and the most convenient manner of carrying the same into effect, I wish it to be understood that I do not confine myself to the precise working details herein laid down, as the same may be modified according to the requirements of each operation without departing from the principle of the invention;—

But what I claim is,—

First, the application of gold and silver to metals incapable of direct amalgamation, by means of the processes hereinbefore described.

Secondly, the employment of photographic, heliographic, and printing processes, for the production of the reserves on the metallic surfaces, to be operated on by the means hereinbefore described.

Thirdly, the use of chromic acid for the destruction of the nickel, copper, antimony, or other metal employed in these processes, as hereinbefore described.—In witness, &c.

Alexandre Henri Dufresne.

Specification of the Patent granted to GERMAIN BARRUEL, *Chemist, of 24, Rue Hautefeuille, in the City of Paris, for Improvements in Treating Cotton Seed.*—Dated May 22, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in obtaining products from cotton seed by distillation. The products thus obtained are gas suitable for illumination, paraffine, and also an oil which may be used for lubricating and other purposes, besides which other products are obtained similar to those ordinarily obtained in the manufacture of gas. The residue left in the retort may be treated to obtain potash therefrom.

And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the means pursued by me.

The cotton seed, either whole or in a crushed state, is submitted to the action of heat in a close vessel, when the organic matters decompose in the ordinary manner, and produce gas, pyroligneous acid, a considerable quantity of ammonia, and a large proportion of fatty matters of great value. The cinders produced by the carbonization of the grain contain, together with other salts, an important quantity of potash which may be dissolved out by water. The apparatus which I employ for conducting the distilling process is arranged so as to condense the fatty matters and also the aqueous products of the distillation; and apparatus of the ordinary description is added for purifying the gas by means of lime, which absorbs the carbonic acid, the ammonia having been first separated by means of acid or otherwise. The cinders produced by the carbonization of the grain are treated in the ordinary manner to separate the potash therefrom. The fatty matters obtained may be redistilled or otherwise treated, according to the purpose to which they are to be applied.—In witness, &c.

GERMAIN BARRUEL.

Specification of the Patent granted to William Gossage, *of Widnes, in the County of Lancaster, Chemist, for Improvements in the Manufacture of Certain Kinds of Soap.* —Dated May 31, 1856.

To all to whom these presents shall come, &c., &c.— My invention of "Improvements in the Manufacture of Certain Kinds of Soap" applies, firstly, to the production of those kinds of soap which are or may be manufactured by combining certain compounds obtained by the union of silica with soda or potash with true soaps, which are prepared by the combination of alkali with tallow, resin, oil, or other such substances.

In the specifications which have been duly filed in pursuance of the conditions of three several letters patent granted to me for my inventions of improvements in the manufacture of soap, I have described certain methods by which I cause compounds of silica with soda or potash to become combined with soaps produced by the union of oily, fatty, or resinous matters with alkali. In the experience which I have acquired by the use of my said inventions, I have found it desirable to reduce the proportionate quantity of soda or potash in combination with silica in the compound of silica which I employ, and thereby to produce a compound soap containing silicate of soda or silicate of potash of a milder quality than those compound soaps containing such silicates in which the proportionate quantity of soda or potash has not been so reduced. I can effect the object of this first part of my invention by adding the said compounds of silica and soda or potash to the oily, fatty, or resinous matters, or to the oily or fatty acids (which I employ for the production of the true soap forming part of the compound soap I am manufacturing), in such manner that the oily, fatty, or resinous acids (or some portions of the same) contained in such oily, fatty, or resinous matters which I employ may become chemically combined with some portion of the soda or potash which is present in the compound of silica which I employ, and I thus produce true soap by the abstraction of soda or potash from the compound of silica employed, and I cause the true soap so produced to form part of the compound soap manufactured.

I have found the employment of the following proportions

of materials and mode of working, when using silicate of soda, to be well suited for effecting the objects of this first part of my invention:—I take sixty hundredweights of palm oil or tallow, and twenty hundredweights of resin, and melt these together; or I take thirty hundredweights of palm oil or tallow, and thirty hundredweights of oleic or stearic acid, and melt these together; or I take thirty hundredweights of palm oil or tallow, and thirty hundredweights of cocoa-nut oil, and melt these together. I take thirty hundredweights of any of the above defined mixtures of oily, fatty, or resinous matters in a state of fusion at a temperature of about one hundred and fifty degrees (Fahrenheit), and I add the same gradually to a mixture of eighty hundredweights of solution of silicate of soda having a specific gravity of one thousand three hundred, and twenty hundredweights of caustic soda lye (specific gravity one thousand one hundred and eighty), also at a temperature of about one hundred and fifty degrees, and I mix the same together by agitation.

I also put into an ordinary soap copper thirty hundredweights of the same mixture of oily, fatty, or resinous matters, and I add thereto, gradually, forty hundredweights of caustic soda lye (specific gravity one thousand one hundred and eighty) mixed with twenty hundredweights of water, and I boil the same together so as to produce saponification of the materials employed. I then transfer gradually the before-mentioned mixture of oily, fatty, or resinous matters with silicate of soda and soda lye, which I have previously prepared, into such soap copper, and continue to boil the mixture so produced, and I add thereto three hundredweights of common salt. I continue the boiling until I judge that the mixture has become reduced to ten tons in weight, and I cleanse the same into ordinary soap frames, wherein the soap solidifies by cooling, and becomes fit for use. I can also effect the object of this first part of my invention, namely, that of reducing the proportionate quantity of soda present in the silicate of soda (which I employ), by the use of "bicarbonate" or "sesquicarbonate" of soda. I have found the employment of the following proportions of materials and mode of working to be well suited for effecting the objects of the first part of my invention when using "bicarbonate" or "sesquicarbonate" of soda for such purpose:—

Having prepared (in accordance with the particulars set

forth in the specification filed in pursuance of the conditions contained in the letters patent granted to me, bearing date the 23d of April, 1855,) a quantity of ten tons of compound soap containing silicate of soda, by the process of soap manufacture, therein designated as "close boiling without separation of lyes," I add thereto (the boiling operation being continued) four hundredweights of "bicarbonate" of soda or eight hundredweights of "sesquicarbonate" of soda, mixed with eight hundredweights of water; I continue the boiling operation until I judge that the quantity of compound soap has become reduced to ten tons. I cleanse the compound soap produced into ordinary soap frames to become solidified by cooling.

I can also produce a compound soap containing silicate of soda, having a reduced proportionate quantity of soda combined with silica present therein, by mixing silicate of soda and "bicarbonate" or "sesquicarbonate" of soda with that quality of true soap known by soap-makers as "fitted soap." For this purpose I take one ton of "fitted soap" and add thereto five hundredweights of silicate of soda (specific gravity about one thousand four hundred and fifty), I mix the same together at suitable temperature; I then add half a hundredweight of "bicarbonate" of soda or one hundredweight of "sesquicarbonate" of soda previously mixed with two hundredweights of water, and I mix the whole well together, either by "crutching" in soap frames, or I prefer to effect the mixing in such an apparatus as I have described in the specification filed in pursuance of the conditions of letters patent granted to me, and dated the 3d of August, 1854, and I then effect such mixing in the same manner I have therein described as suitable for mixing genuine soap with viscous solution of soluble glass. I vary the strength and proportionate quantity of the silicate of soda used, also of the mixture of "bicarbonate" or "sesquicarbonate" of soda and water, according to the quality of compound soap which I desire to produce. When I use silicate of potash in place of silicate of soda in the manufacture of compound soaps, I prefer to apply such silicate to true soaps made with potash, which are known as soft soaps, and I proceed in the same manner as I have hereinbefore described in making hard soaps with silicate of soda.

My invention of improvements in the manufacture of certain kinds of soap applies, secondly, to the production of

compound soaps possessed of good detergent properties, by adding to true soaps produced by the combination of alkali with tallow, resin, oil, or other such substances, (preferring that such soaps shall be in the state of "fitted soaps,") "bicarbonate" or "sesquicarbonate" of soda or of potash, or precipitated carbonate of lime, magnesia, or alumina, or precipitated silicate of lime, silicate of magnesia, or silicate of alumina. When I use "bicarbonate" or "sesquicarbonate" of soda or of potash, I mix such carbonate as I employ in the state of powder with about six times its weight of water, and add about five hundredweights of such mixture to one ton of true soap and mix the same well together. When I use carbonate of lime, carbonate of magnesia, or carbonate of alumina, I dissolve muriate of lime, sulphate of magnesia, or sulphate of alumina in about four times its weight of water, and mix therewith about an equivalent proportion of carbonate of soda also dissolved in four times its weight of water, and I thus obtain a thick fluid, which I mix with about three times its weight of true soap. When I use precipitated silicate of lime, silicate of magnesia, or silicate of alumina to mix with true soap, I prepare such silicate by precipitation from a solution of silicate of soda or of potash, by the addition of a salt of lime, or of magnesia, or of alumina held in solution by water; I prefer to take solution of silicate of soda or of potash, of specific gravity one thousand two hundred, and I add solution of salt of lime, or of magnesia, or of alumina, or a mixture of some or all of such salts, having about the same specific gravity, until I find that no precipitation is occasioned by the further addition of such solution, and I then add about one-fourth part as much silicate of soda or of potash as was previously present in the mixture. I thus obtain a pasty fluid containing silicate of lime, silicate of magnesia, or silicate of alumina, or a mixture of some or all of such silicates, and some silicate of soda or of potash, and I add such pasty fluid to true soaps in such proportion as I find suitable to make the quality of compound soap which I desire to produce.

I have hereinbefore mentioned certain proportionate quantities of materials, also certain modes of proceeding which I have found suitable for effecting the objects of my invention, but I do not confine myself to the proportionate quantities of materials or the modes of proceeding herein mentioned, as these may be varied to some extent without deviating from the nature of my invention.

I claim as my invention, secured to me by the royal letters patent hereinbefore partly recited,—

First, the manufacture of compound soap (containing silicate of soda or of potash) in which the oily, fatty, or resinous matters or acids employed in the manufacture of such soap have been caused to abstract a portion of alkali from such silicate of soda or of potash, and thereby to produce compound soap containing silicate of soda or of potash of mild quality; also the manufacture of such compound soap (containing silicate of soda or of potash) in which "bicarbonate" or "sesquicarbonate" of soda or potash is used, for the purpose of rendering such silicate of soda or of potash of milder quality.

Second, the manufacture of compound soaps of good detergent quality, by adding "bicarbonate" or "sesquicarbonate" of soda or of potash, or by adding precipitated carbonate of lime, of magnesia, or of alumina, or by adding precipitated silicate of lime, of magnesia, or of alumina, to true soaps.—In witness, &c.

William Gossage.

Specification of the Patent granted to Joseph Bauzemont, *of Paris, France, for Improvements in Purifying Turpentine.*—Dated June 3, 1856.

To all to whom these presents shall come, &c., &c.—My invention relates,—

First, to the purification of turpentine; and

Secondly, to the mixture of the turpentine so purified with ether for producing liquids applicable for cleaning cloths or other stuffs or fabrics.

My improved processes consist in purifying the turpentine of commerce by distilling together with the materials and in the proportions as follows:—

First, spirit of ordinary turpentine, forty pounds (avoirdupois); second, of vegetable coal pulverised, two pounds (avoirdupois); third, of sainfoin, straw, paper, or any analogous substance, two pounds (avoirdupois); fourth, pure water, two pounds (avoirdupois).

The distillation is effected over a small fire in a common alembic or still having a double bottom and a swan neck.

The pulverised coal is inclosed in a linen bag immersed in the liquid immediately over the double bottom, the inner bottom being studded with numerous perforations; the straw material is placed over the bag containing the coal. When the distillation is completed it is only necessary to decant or draw off the product obtained and afterwards to separate it from the water evaporated with it, and preserve it in well stoppered bottles.

The coal and the straw absorb all the fatty, bituminous, and resinous matters, and all the carburated compounds that existed in the turpentine, and the water takes up the acid and organic salts previously held in solution by the turpentine.

The products thus obtained may be distilled a second or a third time, according to the same process.

The turpentine thus purified can be used for all the applications of ordinary essence of turpentine, and is particularly applicable for cleaning and scouring purposes.

My invention consists also in mixing the purified turpentine thus obtained immediately after distillation with ether, which combination of ether and turpentine is adapted for cleaning purposes in cloths and stuffs of the kinds most difficult to be cleaned. These mixtures are formed as follows, according to the purposes for which they may be required:—First mixture, one-tenth of ether, mixed with nine-tenths of purified turpentine; second mixture, one-fifth of ether, mixed with four-fifths of purified turpentine; third mixture, two-fifths of ether, mixed with three-fifths of purified turpentine.

After the complete maceration or combination of the two liquids, which requires, according to the temperature, from three to six days, they may be employed for the purposes required. The first for cleaning simple spots or stains on coarse cloths or stuffs; the second liquor may be used for cleaning skins and textile fabrics generally; the third liquor for removing stains or spots that are difficult to be removed from the most delicate fabrics.

The above liquors must be preserved in well-stoppered bottles or other vessels closed air-tight.

Having described the nature of my invention, and the manner of performing the same, I desire it to be understood that I claim as my invention and exclusive right,—

First, to purify turpentine by distilling it with the materials as hereinbefore described.

Second, the composition of the cleaning liquors, as above specified, or any other combination or use of the turpentine so purified.—In witness, &c.

JOSEPH BAUZEMONT.

Specification of the Patent granted to HENRY BOLLMANN CONDY, *of Battersea, for Improvements in Defecating or Purifying Acetic Acid and other Solutions; also in Disinfecting Rooms and other places, and in Preserving Wood.*—Dated July 7, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in using the manganate or permanganate of soda or potash for defecating or purifying acetic acid and other solutions, for disinfecting rooms and other places, and for preserving wood, which substances have never heretofore been used for these purposes. And in the manufacture of acetic acid it is further purified by roasting the acetate of lime from which it is made in a revolving retort or vessel, or a retort or vessel furnished with a mechanical agitator, by which arrangement the acetate of lime may be more uniformly roasted and the impurities more completely driven off than heretofore. In order to separate the acetic acid from the acetate of lime, sulphuric acid is added thereto, and the mixture is placed in bags and the acetic acid pressed out, the gypsum remaining in the bags.

And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the method in which I prefer to conduct the processes.

In order to purify acetic acid, I add thereto a solution of manganate of soda, in such quantity that the manganate shall exist in the mixture in the proportion of one part to every two hundred parts of acetic acid; the result is the precipitation of peroxide of manganese, which I allow to subside during about four days, and then run off the clear liquid, to which I add powdered wood-charcoal in the proportion of one part to one hundred parts of acid, and I diffuse the powdered charcoal through the whole of the liquid by frequently stirring it. Finally I draw the acid off the charcoal, and distil it in the ordinary manner, but

separating, to be again treated, the portion (say one-fifth of the whole) which first distils over, as it will be found less pure than that which passes over afterwards. Sometimes, when the acid treated is originally very impure, I repeat the process on the whole quantity. When using per-manganate of soda in place of manganate of soda, I use one part thereof to three hundred parts of acid; in other respects the process remains the same.

I would here remark that I prefer that previously to applying the process above described the acetic acid should be partially purified by combining it with soda or lime, roasting the salt formed, and afterwards decomposing it with acid, as is now ordinarily practised.

For purifying dilute alcohol and other solutions, manganate is added in a similar manner before distillation.

The manganate and per-manganate of soda I have also found to be very useful for disinfecting rooms and other places; and in using these substances for this purpose, it is only necessary to expose them in small quantities in the room or other place which it is desired to disinfect.

For preserving wood by means of manganate or per-manganate of soda or potash, I prepare a solution of either of these salts by dissolving one part of the salt in two and a-half parts of water, and I cause such solution to permeate the wood as completely as possible, which may be effected by any of the processes now in use for saturating wood with other preserving solutions. When I wish the solution of manganate or per-manganate to act only on the surface of the wood, I prefer to use a stronger solution, containing one part of salt to, say, two parts of water, and this solution I lay over the surface of the wood by means of a brush.

Another part of my invention consists in a method of roasting acetate of lime. The first process of purifying crude acetic acid consists in combining the same with soda or lime, and roasting the salt formed. Now, heretofore, in the manufacture of the purer qualities of acid, lime has rarely or never been used for this purpose, in consequence of the great difficulty in roasting the acetate of lime completely; for this salt, if at all over-heated, is liable to take fire, and burn into carbonate of lime.

Now, my invention consists in roasting this acetate of lime in a retort or vessel so arranged as mechanically to agitate the salt, and thus to prevent any portion thereof from remaining long in contact with the heated surface of

the retort or vessel. The retort which I prefer to employ is an iron cylinder twelve feet long and nine inches in diameter, heated by a furnace, in the same way as gas retorts are heated. At its two ends it is left partially open, and it is mounted on axes on which it rotates continuously at the rate of about fifteen revolutions per minute. The salt to be roasted should be thoroughly dried and powdered, and is then fed by a hopper or long narrow spoon into one end of the retort, which end I prefer to be about two inches higher than the other end, so that the retorts work at a slight inclination, and, in consequence, the salt fed in at the upper end is, after remaining a sufficient time in the retort, regularly discharged at the lower end thereof. If it should be found that the salt is not rendered perfectly inodorous by one roasting, this process is to be repeated.

In order to assist in maintaining a uniform temperature, I place a thermometer in the mouth of the retort, and I regulate the temperature of the salt to as near 350 degrees as possible; in any case 400 degrees should not be exceeded, or there will be danger of the salt taking fire; and if, on the other hand, the temperature is lower than 300 degrees, the roasting will not be perfectly effected.

In order to separate the acetic acid from the acetate of lime, I use (as heretofore) sulphuric acid; but I conduct the process in the following manner:—

I make a concentrated solution of the salt, and add thereto sulphuric acid, until all the lime is converted into sulphate. I then throw the mixture on to a filter, to let the acetic acid drain off as far as it will do so; afterwards I transfer what remains on the filter to strong bags, made of closely-woven fabrics, and I submit these bags to a heavy pressure by a screw or hydraulic press. The gypsum which remains in the bags I mix with water, which I then filter, and thus obtain a weak acid solution, which I use for dissolving a further quantity of acetate of lime, so as to recover the acid which such weak solution contains.

This method of separating acetic acid from acetate of lime I also employ to separate the acid from unroasted acetate of lime, when I wish to make an acid of ordinary quality, and the acetic acid obtained by the process I distil in the usual manner.—In witness, &c.

HENRY BOLLMANN CONDY.

Specification of the Patent granted to James Clark, *of Newton-heath, Manchester, India-rubber Manufacturer, for Improvements in the Manufacture of Waterproof Fabrics.*—Dated July 21, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in rendering fabrics waterproof by means of india-rubber, gutta percha, or any other adhesive matters or mixtures or combinations of india-rubber, gutta percha, or any other adhesive matters. I shall now describe, as completely as possible, the nature of my invention and the modes of carrying it out:—I take a piece of cloth or fabric of any convenient length and coat it with the waterproof composition, and I then perforate or cut out holes of about one-eighth of an inch in diameter, and at from two to three inches apart in this coated fabric, and unite it (the waterproof composition being in a plastic or adhesive state) to another fabric non-waterproof, thus forming what is usually called double texture cloth. This double texture fabric will then consist of a complete texture on one side and a perforated texture on the other side. The complete fabric side is that which is worn outside, and although submitted to the action of rain, the water does not penetrate through the perforations, but runs down the surface, any heat or vapour or perspiration escaping from the interior by the perforations. This double fabric being perforated on one side may appear unfinished and objectionable, and in order to obviate this I coat the perforated fabric before-mentioned with waterproof composition, then unite a fabric to each side, leaving the perforated fabric in the centre, thereby producing what may be called a treble fabric, and it is capable of being used on either side.

The perforations in all these cases may be made, either before or after the fabric is coated with the waterproof composition.

In place of employing a perforated and coated fabric, as above described, I find that a thin sheet or film of waterproof composition (such as sheet india-rubber) of suitable length and width may be used, which, being perforated, may be united by any suitable means to one or more fabrics; I also find that paper may be coated with waterproof com-

position, then perforated, and afterwards caused to adhere to the surface of a fabric, and when the adhesion is complete the paper may be removed by washing.

In place of using a piece of cloth or fabric coated and perforated, I find a good and useful waterproof and ventilating fabric can be produced by using strips of cloth or fabric, about two or three inches wide, which being coated on one or both sides, as may be required, are united to one or more fabrics, leaving small spaces, say about one-eighth of an inch, between each of the strips for the vapour or perspiration to escape.

Another mode of producing waterproof, yet ventilating, fabrics is as follows:—A cloth or fabric of any convenient length is coated or covered with waterproof composition in such manner that portions of the cloth are left uncoated or uncovered, such uncoated portions being of any suitable form. I prefer to accomplish this partial coating by printing the cloth or fabric with the waterproof composition by the mode ordinarily employed in printing fabrics. The waterproof composition is supplied to the engraved or pattern cylinder or roller, is cleaned off by means of a doctor or doctors, and then the fabric to be printed is pressed against the roller by a cylinder covered with woollen fabric, as is well understood; after being thus printed or coated, the cloth or fabric is either employed in this state as a waterproof covering, or it is united to another fabric, thus forming a double texture cloth, having the waterproof composition between the two fabrics, the uncoated portions forming channels for the escape of the heat or perspiration.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to any particular mode of producing the waterproof and ventilating fabrics above described.

But what I claim is,—

The production of a waterproof, yet ventilating, fabric by means of perforating the waterproof medium or tissue, only leaving the outside fabric or fabrics complete and entire, or by means of partial coating or printing on of the waterproof composition.—In witness, &c.

James Clark.

Specification of the Patent granted to Gustavus Gidley, *of* 14, *Clinger-street, Hoxton, and* William Christopher, *of* 2, *Oak Villa, Pinner, Middlesex, for Reducing the Bottle or Imported India-rubber to a Transparent Liquid State, so that it may be used as a Transparent Varnish or Solution for Mixing with Colours.*—Dated June 2, 1856.

To all to whom these presents shall come, &c., &c.—Our invention consists in subjecting india-rubber (preferring the bottle india-rubber) to an alkaline action, also to processes of boiling in water, and then dissolving the india-rubber in suitable solvents, as hereafter described.

The india-rubber, having been cut into pieces of a few ounces each, or less, is placed in a copper or boiled with an alkaline solution, preferring carbonate of soda by reason of its cheapness, using about 1lb. to each gallon of water; and we boil the india-rubber in this solution for forty to sixty hours, till the dark or black colour is removed and the india-rubber is brought to a light or whitish brown colour. The india-rubber is then to be boiled in water for about four or five hours, in order to free the india-rubber from the alkali.

The india-rubber thus obtained is then to be dissolved in like manner to that heretofore practised when using crude india-rubber, by a solvent such as heretofore employed, but by reason of the india-rubber having been subjected to an alkaline and boiling process, as above explained, the solution obtained will, when laid on to surfaces, be transparent, and hence be more suitable to be used in preparing transparent varnishes, and also for mixing with colours, than other solutions obtained from crude india-rubber have heretofore been; but we would state, that the solution of the purified india-rubber above described may be improved by applying a small quantity of water, say, about a table-spoon full to each quart of the solution, then by shaking the solution well for a short time, and then allowing the solution to stand, when the water and impurities will separate, and the solution may be run off therefrom. In thus using water we find that, if it be used cold, the solution will produce a bright surface when used in varnish,

and when hot water is used the surface will be "flat," or dead.

The solution of india-rubber, whether water be used or not, is to be combined with dryingoil, in order to facilitate its becoming hard and dry when used as a varnish, and such solution of india-rubber may be combined with solutions of gums, isinglass, or gelatine in spirit, and also with colours, and may be used on fabrics and other surfaces.

We would, however, remark that we make no claim to combining such matters with solutions of india-rubber, nor do we confine ourselves to the use of carbonate of soda, as carbonate of potash may be used in place thereof; but what we claim is, the manufacture of solutions of india-rubber first subjected to alkaline and boiling processes, such as are herein described.—In witness, &c.

WILLIAM CHRISTOPHER.
GUSTAVUS GIDLEY.

Specification of the Patent granted to GEORGE TOMLINSON BOUSFIELD, *of Sussex-place, Loughborough-road, Brixton, in the County of Surrey, for An Improvement in the Manufacture of Driving Straps or Bands.*—Dated July 24, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—Leather banding or belting in ordinary use is objectionable on account of its great expense and the numerous splices or joints necessary in making a belt or band of any considerable length. To obviate these objections belts and bands have heretofore been manufactured by coating long pieces of heavy duck with a thin sheet of rubber, then folded in several thicknesses, to form the belt desired. But these bands or belts do not possess the requisite strength, and on account of their peculiar formation are very liable to accidents. The folds of the duck also separate, particularly when the edges are at all worn.

The object of the invention is to form a material as nearly like leather as possible, which would possess the requisite strength and also be susceptible of being made of any requisite length in one piece, and, further, which would

present a better friction surface to the drum over which the belt passes than any belt now in use.

The materials of which these belts or bands are composed is india-rubber compounded with the cotton or fibres of flax. The process is as follows:—

I take the rubber, when compounded with sulphur in any of the ordinary compounds used in vulcanizing rubber goods, and when it is in the state ready to be submitted to the vulcanizing process,—that is, a substance like stiff dough or paste,—and mix it with fibres of cotton or flax by grinding the materials between heated rollers in the mode usually practised by rubber manufacturers, until the fibre is thoroughly incorporated with the rubber. The proportions I prefer are three pounds of rubber to one pound of flax or cotton, although these proportions may be varied according to the quality of fabric desired. Instead of mixing pure cotton or flax with the rubber, an economical and simple method of obtaining a like result is that of grinding between heated rollers the rags or scraps of cloth covered with rubber compound, which are made to waste by manufacturers of shoes and other rubber goods. To these rags may be added, in grinding, more or less rubber compound, according to the nature of the rags and the quality of the fabric desired. The fibrous compound obtained in either of the above modes is passed through heated calender rolls, and formed into a sheet of the requisite length and width, and of the thickness of one-eighteenth part of an inch. This sheet is to form one side of the belt; and in this process of grinding and passing the fabric through the heated calender rollers, the fibres of the cotton and flax are laid in a direction parallel to the length of the belt or band. This position of the fibres gives great strength to the belt lengthwise; but, in order to prevent it from being torn, and for other reasons, it is necessary to have strength in a crosswise direction also. For this purpose I take a similar sheet, prepared in the same way, and cut it into pieces as long as the width of the first sheet. These pieces are cut with bevel edges, and laid crosswise on the first sheet, with the edges overlapping each other. A third sheet, similar to the first, is then laid on the top. The whole is then passed again through the heated calender rollers, for the purpose of consolidating and uniting the fabric, and is then vulcanized in the mode well known to all india-rubber manufacturers. I have described a belt or band three-sixteenths

of an inch, and made of three layers; but the thickness of the belt may be increased or diminished, according to the wish of the manufacturer. I have described the mode of forming the belt or band, with its fibres arranged so that a portion of them is laid lengthwise and a portion crosswise, this being the best method; but the crosswise fibres may be dispensed with, and yet a very good band or belt produced.

In manufacturing, the most economical method is, to make the sheet or belt of nearly the width of the calender rolls, which are usually a yard or more in width; these sheets may then be cut into the desired width for belts either before or after vulcanizing.

The fabric thus obtained will be found to be of great strength, and to possess a remarkable resemblance to leather in the internal arrangement of its fibres.

One great advantage of this fabric over india-rubber belts or bands hereinbefore described is, that it can be cut into a number of smaller bands if any accident happens to it: this, for obvious reasons, is impossible where the belt is formed of layers of duck.

The belt or band, on account of the peculiar nature of its fabric, is not liable to slip on the drums or pulleys, as is the case with leather belting, and thus saves power and gives uniformity to the motion of machinery.

I do not claim the modes of preparing the rubber or of compounding or vulcanizing the fabric, nor the machinery used therefor, as these are all well known to manufacturers of rubber goods; nor do I claim the compounding of fibres of cotton or flax with india-rubber, as this has been done for the purpose of packing steam joints and for other similar uses; but it has never been done in the manner described in the foregoing specification; nor has it ever before been used to constitute the fabric known in commerce as belting or banding; nor do I desire to claim by this patent the new process of making fibrous rubber goods in such a form that the fibres are arranged crossing each other, in the manner above described, for the purpose of making the fabric to resist tension in all directions, and giving it flexibility without elasticity; as this new process and fabric I intend to make the subject of a separate application for letters patent. But what I do claim and desire to have secured by letters patent is, the improvement in the manufacture of rubber belting or banding, which consists in compounding fibres of

cotton or flax with india-rubber substantially in the manner and by the processes above described.—In witness, &c.

GEORGE TOMLINSON BOUSFIELD.

Specification of the Patent granted to WILLIAM EATHORNE GILL, *of Totnes, Devonshire, Engineer, and* HENRY BRINSLEY SHERIDAN, *of Parsons Green, in the County of Middlesex, Gentleman, for Treating Fish for Oil, and Utilizing the Products of such process.*—Dated April 3, 1855.

To all to whom these presents shall come, &c., &c.—Hitherto fish has been used in some situations for manuring land unprepared, being thrown upon the land in a more or less decomposed state; or the refuse of fish markets has been treated chemically and combined with other chemically prepared materials to form a compost for manuring land; fish has also been treated with acids and otherwise chemically prepared and combined; but in all these applications of fish as a manure the full effect of fertilization has been more or less impaired, and, where treated chemically, the results attained have been too costly for commercial use.

But the bones and adjacent parts of fish contain the principal elements of fertilization, and the flesh, when freed from the oil and perfectly desiccated, possesses valuable properties as a fertilizer. And it has been found by us in the course of our experiments that many kinds of fish caught upon the coast of Ireland, and elsewhere on our sea coasts, are entirely wasted, being separated from the more commercially valuable fish, and thrown back into the sea; and in the fish preserving and curing establishments, both at home and abroad, the flesh is separated from the bony parts, head, &c.; the latter being thrown away as valueless. Now, it is more particularly to perfectly apply these valuable materials at present wasted that our invention is intended; for such materials treated according to our invention produce a manure equalled only in its fertilizing properties by the best Peruvian guano, and as, unlike the chemically prepared compositions, fish material prepared according to our invention has no tendency to secondary decomposition, or to become in anywise impaired by time, when properly packed

and stored. And we have found by chemical analysis of some of the samples of waste fish material prepared by us according to our invention, that the following high results have been attained; and the following analysis, although here given by way of example, is not the unvarying result of our invention applied to every kind of fish (as will be readily understood by any practical man), inasmuch as the bones, gut, and other waste parts of fish vary in their percentage of the gross weight of the materials treated, as well as varying in their chemical proportions and quantities, but the cost of treating the most useful or chemically valuable fish, or parts of fish, is the same as treating the poorer kinds.

Analysis of sample of manure prepared according to our invention:—

	per cent.
Moisture	12·85
Organic matter . .	56·00
Silica	0·80
Phosphate of lime . .	24·70
Alkaline salts . . .	5·65
Total .	100·

Nitrogen = 7·76. Ammonia = 9·41.

Our invention of treating fish for oil, and utilizing the products, the chief product being an article we denominate normal guano, is as follows:—

We take fish, or any part or parts of fish, and subject the same to great pressure between iron rolls or rollers, having so arranged the connexions between the said rolls or rollers and the prime mover, by cog wheels or other contrivance for communicating motion, so that these rolls or rollers shall have a dissimilar speed; and the difference of speed we have found to best suit our purpose is, when one roll has made twelve revolutions, the other has also fifteen revolutions in the same time. But we do not confine ourselves to that particular relation of speed, but allow the speed to be regulated by the nature of the fish used, seeing the tougher fish, such as dog fish, would invite a greater difference of speed, perhaps as twelve is to eighteen, to secure a sufficient rupture of the tissue of the fish, and facilitate the expulsion of its oleaginous and aqueous contents when pressed by the rollers or rolls. This fric-

tional pressure to which the fish has thus been subjected by rolls of as large diameter as may be convenient, affords two results, the one solid and the other liquid.

The solid or compressed fish we receive on an endless apron of open-wove iron or zinc wire, and by it is conveyed, when put in motion by any connexion with the prime mover, direct or indirect, into an open trough, in which is made to work or revolve an endless or archimedian screw. The operation of this screw is to bring to one end of the said trough whatever solid matter may have been brought over by the said endless web or apron, and had been allowed to fall therefrom into this trough. This solid matter now accumulated in a suitable receptacle placed for that purpose at the further end of the trough, and an endless chain or belt made to carry a series of buckets, dips into this receptacle, and removes or conveys the solid fishy contents to a higher level, which motion is also derived from the prime mover by any of the many well-known mechanical arrangements. This solid fishy matter is thus raised sufficiently high to be delivered into the upper one of a series of iron troughs; in each of these troughs a worm or archimedian screw is made to revolve, and is so arranged as to cause the contents to pass from one end of the trough, where it was received by an opening in its upper side, to the other end of the trough, where its contents are delivered by their gravity through a suitable opening in the lower side, where the said contents are allowed to fall into an opening in the upper part of the trough next and immediately below it in the series of troughs, the screw of which is made to revolve in the contrary direction, so as to deliver the contents of such trough at the opposite end thereof, and so on from that trough to the next lower in the series. This process is repeated through five or six of such troughs, or until the normal guano which was the fishy matter has become sufficiently dry for commercial purposes.

The liquid portion of the produce from the rolls passes through the wire-wove endless apron, and is received on an inclined platform, and flows off by suitable channels into tanks. It may now be treated as desired by the usual process of boiling, skimming, &c., or by allowing the water and the oil, &c., the opportunity and time to obey the laws of gravity when the separation of a cheap article is desired.

M 2

The oily matter obtained may be separated, purified, or treated by any of the known processes to make it suitable for the various purposes to which it may be applied. It may be desirable when in a large manufacture to arrange over the rolls two sets of toothed rolls, similar to those used in bone-crushing mills, and the fish may there be primarily treated as bones are crushed, and the supply to the rolls be thus regulated with a great accuracy.

The troughs in which the archimedian screws revolve are of iron of a crescent form, having a longitudinal opening on the upper part, as is formed of two thicknesses or sheets of iron, having a row of rivets on each side of the longitudinal opening, to join them together, and an increasing space to three inches immediately under the centre of the trough; this space to be filled with steam of three hundred degrees or more from the boiler. We prefer an adaptation or modification of the archimedian screw, where employed, so that it be not a continuous web or blade, but a series of bolts having their ends bent to the same angle as the blade of such a screw as would be necessary, and properly secured to the centre or shaft. Our intention in this arrangement is to break up the cakes or clots of fishy matter, to facilitate the drying of it, and produce a normal guano in every respect fit for the immediate use of the agriculturist. But as soils are known to differ in their composition, and so require an adjustment of the manures applied to them, we introduce any required saline or other ingredients, in determined proportions, into the first of the series of evaporating and mixing troughs, so that all may be well incorporated together. We also introduce blood, bone, or other animal or fœcal matter when desirable.

Having fully described our invention, its peculiarities, and relation to some existing and more or less well-known processes, we wish it to be understood that we do not claim the expressing of oil from fish by rollers, mounted and geared in the ordinary manner of mounting and gearing rollers for crushing or compressing such like materials; nor when such treatment is performed upon fish for producing and utilizing the oil alone, as, for instance, in treating the livers and parts of the cod fish for cod liver oil. But we claim treating fish for oil in the manner described, by which the cellular tissues of the fish, both of flesh and bones, are thoroughly ruptured, and the fluids liberated and expressed therefrom, the fluid parts being separated from

the solid parts, and by the further mechanical contrivances described, or their equivalents, for breaking up, carrying on, and mixing the solid matter, as also the combination of the heat from steam introduced into parts of such mechanical arrangements, by which the solid parts of such fishy matter are gradually desiccated in their progress through the machine, and while in course of manufacture, by which it is converted into normal guano, which may be used either alone or in combination with other matters which may be mechanically combined therewith.

We also claim the differential arrangement of geared rollers, and the other mechanical parts described, whether they be employed separately or combined when used for treating fish for producing a manure, and whether the oil expressed from the fish or parts of fish be made commercially useful or not.—In witness, &c.

William Eathorne Gill.
Henry Brinsley Sheridan.

SCIENTIFIC MISCELLANEA.

MEASUREMENT OF THE SPEED OF A RAILWAY TRAIN, BY MEANS OF ELECTRO-MAGNETISM.

BY WM. C. M'RAE, TELEGRAPHIC ENGINEER.*

The wheels of a car rotate a certain number of times in going over a given space of road; for example, suppose a car-wheel to be eight feet in circumference, it will rotate 660 times in going the distance of a mile. Now, if the car were so constructed that the body would always remain at an equal distance from the axle, which is prevented by the motion given it by the springs, it would not be difficult to bring the wheel at each revolution to so bear upon a lever as to rotate a wheel inside the car, which might have as many cogs as the car-wheel rotates times, in going a mile. Or, by a series of clock-work wheels, the indicating wheel might contain a fractional number of cogs in proportion to the number of times which the car-wheel would rotate in a given distance.

The difficulty occasioned by the unsteady motion of the car, owing to the springs, may be overcome by the use of magnet, battery, and galvanic circuit. The latter to be so arranged as to be broken at each revolution of the car-

* From the "Journal of the Franklin Institute."

wheel or axle. So by this means the operation of the magnetic contrivance would be to move the speed-indicator the distance of one cog.

A contrivance of this kind may be so constructed as not to require winding, in order to have it in readiness for use.

The indicator may be so constructed as to have an index placed over it, in such a position that the hand on the indicator should move it a sufficient distance to show, at each successive rotation, the number of miles already travelled.

The kind of battery most suitable for such a contrivance would be that of the "sand battery;" which, if properly constructed, may be made to act with as much certainty as any other, and at far less expense. This battery should be constructed with sand of such quality as is used by the manufacturers of glass, that is, free from dirt of any kind. The battery cup may be that of the ordinary kind, as used in Grove's battery, or if larger glass or porcelain jars can be obtained, they would doubtless be better, affording an opportunity for the use of larger plates of zinc and copper; these should be placed about an inch apart, and the sand packed tightly around them. The zinc should be amalgamated, and the copper rubbed with a piece of emery paper, before placing in the cup; the sand should then be well moistened with sulphuric acid, diluted in the usual proportion for battery purposes. Intensity may of course be increased by increase of acid. A battery of this kind would stand for some weeks, only requiring the addition of a little acid each day, according as the strength of that first put in became exhausted. A series of cups of this kind could be carried on board of a train, without the difficulties which would arise from that of almost any other battery.

ROYAL SOCIETY.

May 8, 1856.—The Lord WROTTESLEY, President, in the Chair.

THE following communication was read:—

"On various Phœnomena of Refraction through Semi-lenses or Prisms, producing anomalies in the illusion of Stereoscopic Images." By A. CLAUDET, Esq., F.R.S.*

The author having observed that photographic pictures representing flat surfaces, when examined in the refracting

* From the "Philosophical Magazine."

stereoscope, have the appearance of concavity, has endeavoured to discover the cause of that phœnomenon, and to explain it.

In order to ascertain if this peculiar effect was attributable to some imperfection in the lenses of the camera obscura which had produced the photographic pictures, or to a property of the stereoscope itself, he began to test the stereoscope without photographic images. For this experiment he placed under each tube of the stereoscope a diagram composed of vertical and horizontal lines crossing each other.

The two diagrams, perfectly identical when seen in the stereoscope, coalesced and formed only one figure; but although each diagram, when seen separately by its corresponding eye, appeared perfectly flat, still the coalescing image of the two presented a surface conspicuously concave; consequently there was no doubt that the same illusion observed in photographic pictures was due only to the effect of the stereoscope. This experiment was decisive, and it remained to discover how the illusion was produced. The investigations showed that the phœnomenon, which is a defect detrimental to the beauty and correctness of the stereoscopic representations and unavoidable in the refracting stereoscope, is a plain illustration of the cause of relief and distance, and yield the clearest explanation of the stereoscopic illusion,—proving that it is founded on the true principles of natural binocular vision.

When we look through a prism placed near the eye at a straight line, the refracting edge of the prism being parallel with the straight line, that line is refracted laterally and appears bent, with its concave side turned to the thin edge of the prism. The two tubes of the stereoscope being supplied with semi-lenses acting as prisms, each lens bends all vertical straight lines, and the concave sides of these lines are turned towards the thin edges of the lenses, and consequently towards each other. When we examine in the stereoscope two curved lines having their concave sides turned towards each other, the result of the coalescing of these two lines is a concave line, the extremities appearing nearer and the centre further. If the convex sides are turned towards each other, the result of the coalescence is a convex line, the extremities appearing further and the centre nearer. By the same reason, if straight lines are bent by the prismatic refraction of the two semi-lenses, as

the bending is effected so that the concave sides are turned towards each other, the result is by coalescence a concave line. The two photographic images will have all their vertical lines bent in the same manner, and the stereoscope will give the illusion of a picture represented on a concave surface.

When we look at natural objects, the optical axes have to converge more for the nearest than for the furthest, in order to obtain a single vision by bringing the same object on the centre of each retina; therefore by habit we judge of the distances by the angle formed by the optical axes required to obtain a single vision. Again, while we look at one object, while other objects in the same line are situated before and behind that object, we have the sensation of their double images on the two retinæ. The double images of nearer objects are situated in the following order: one on the right of the centre of the right retina, and the other on the left of the centre of the left retina; and the double images of further objects, one on the left of the right retina, and the other on the right of the left retina.

In looking at the two pictures in the stercopeeos, we have to converge the optical axes on one point which is beyond the plane of the pictures, so that two of their correspondent or similar points appear respectively on the two lines forming the angle of convergence of the optical axes, and each of these points is represented on the centre of one retina. As the two corresponding points of the two pictures are laterally nearer each other for the first plane and more distant for the receding plane, it follows that the optical axes have to converge beyond the plane of the pictures on a nearer point for the first, and on a further point for the last. Therefore, the angle of convergence by which similar points of the two pictures appear on each axis and consequently fall on the centre of each retina, conveys the sensation of their respective distances; more convergence indicates less distance, and less convergence more distance. All the other corresponding points of the two pictures which are not on the optical axes or on similar points of the two retinæ, form double images; and when we look at one point, all the points of nearer and further planes appear double in the same order on the two retinæ, as when we look in like manner at natural objects; and the situation of double images seen through the stereoscope indicates the distances of the objects they represent, accord-

ing as one is on the right of the right retina and the other on the left of the left retina, or one on the left of the right retina, and the other on the right of the left retina.

This being explained, it is easy to understand what will be the stereoscopic result of vertical lines represented as curved, and having their concavities turned toward each other. The two correspondent points of the top and bottom of the two concave lines, being nearer each other, will require more convergence than the two correspondent points of the centres of the concave lines, and will appear nearer, whilst the two points of the centre requiring less convergence will appear further; the intermediate points from the centres to the extremities of the two bent lines will appear gradually less distant, therefore the coalescence of the two lines bent laterally will produce the illusion of a single line conspicuously concave, in a vertical plane at right angles with the plane of the two separate lines.

Having demonstrated that the semi-lenses of the stereoscope, like prisms, bend laterally all the vertical lines of which the photograph pictures are composed, and that these lines in the two pictures present their concavity to each other, it is evident that the coalescence of the two images must give the illusion of a concave image.

The phœnomenon of the lateral curvature given to vertical lines by the refraction of a prism, which vertical lines, when examined with two prisms, one for each eye, appear by coalescence as one line concave in a vertical plane at right angles with the plane of the two separate bent lines, can be curiously illustrated by the following experiment:—

If, holding in each hand one prism, the two prisms having their thin edges towards each other, we look at the window from the opposite end of the room, we see, first two windows with their vertical lines bent in contrary directions; but by inclining gradually the optical axes, we can converge them until the two images coalesce, and we see only one window; as soon as they coincide, the lateral curvature of the vertical lines ceases, and they are bent projectively from back to front: we have then the illusion of a window concave towards the room, such as it would appear reflected by a concave mirror.

There is another phenomenon which can be noticed when looking at photographic pictures in the stereoscope; sometimes the picture appears to project out and sometimes to

recede from its mountings. The first effect lessens the illusion, and the second renders it more effectual; therefore it is desirable to inquire how we can avoid the one and ensure the other.

We know that the distance of objects is in an inverse ratio with the angle of convergence required to see them single; also that with symmetrical figures or photographic pictures, when the horizontal or lateral distances of the several corresponding points is different, the points less separated will appear nearer, and the more separated will appear further.

Suppose the two correspondent vertical lines of the openings or frames of the pictures be more distant than the two correspondent points of the furthest plane of the picture themselves, then the openings or frames will appear behind the pictures; and suppose the correspondent vertical lines of the openings be less distant than the two correspondent points of the nearest plane of the pictures themselves, then the openings or frames will appear before the picture.

Therefore, when we wish to have the picture appearing behind the openings or their mountings, we have only to take care that the correspondent vertical lines of the mountings should be laterally less distant than the two correspondent points of the first plane of the picture. This can be easily done by taking the measure of the two correspondent points of the first plane by means of a pair of compasses, and tracing the two pairs of correspondent vertical lines bounding the openings, after having slightly reduced the angle of the compasses.

A very simple experiment may show the cause of the illusion of concavity of flat surfaces when examined through semi-lenses, and further prove that semi-lenses may give alternately the illusion of concavity and convexity according to the position of their thin edges; of concavity when their edges are towards each other, and of convexity when they are placed contrariwise. For this experiment we have only to employ a pair of those spectacles mounted with a spring whereby they are held on the nose.

When we read, holding such spectacles with both hands, we may by the elasticity of the spring adjust the two lenses so that the pupils of the eyes can coincide, first, with the two nearest edges; secondly, with the two centres; and, thirdly, with the two furthest edges of the lenses.

In the first case, the page of the book will appear con-

cave, because the pupils will look through the thin edges of the lenses which bend the vertical lines with their concave sides turned towards each other; in the second, the page will appear flat, because the pupils will look through the centres of the lenses which show the vertical lines perfectly straight; and in the third case, the page of the book will appear convex, because the pupils will look through the thin edges of the lenses which bend the vertical lines with their convex sides turned towards each other.

These considerations have led the author to construct a stereoscope which presents flat surfaces perfectly flat. This new stereoscope has two entire lenses instead of two semi-lenses, and the eyes look through the centre of such lenses. The images not being laterally refracted, as in the semi-lenticular stereoscope, their coalescence requires a certain effort of divergence, or to squinting outwards, which a little practice will enable us to perform easily. Persons capable of using this kind of stereoscope will see a picture whose surface is perfectly flat with all the illusion of relief and distance.

All lenses being more or less subject to the defect of bending straight lines when refracted by all the various points of their surface but the centre, and in a greater degree as those points are nearer the edges, it results that when images are produced in the camera obscura by the various points of the whole aperture, they will be bent in various contrary directions, and a certain confusion must arise injurious to the delicacy and correctness of the whole compound image. This may be proved by the following experiments:—If we take the image of a window by a small aperture placed on the right edge of a lens, say of three inches aperture, and another image of the same window, by placing the aperture on the left, taking care to shift the camera so that the two apertures will be exactly on the same line, we shall have two images of the same window apparently identical; but in placing these two images side by side in the central lens-stereoscope above described, first the image of the left side aperture on the right, and that of the right side aperture on the left, secondly the images *vice versâ*, we shall see in the first case a concave window, and in the second a convex window. But in examining the two images in the semi-lenticular stereoscope, we shall see in one case a concave window, and in the other a perfectly flat window, because in the

first case the stereoscope will have increased the bending of the vertical lines of the two images, and in the second the stereoscope will have corrected the bending.

This fact naturally suggests the possibility of correcting the defect of the refracting stereoscope; for if the images of the camera were taken by semi-lenses, the bend resulting from this mode of operating might be corrected by the bend of the stereoscope, care being taken to turn the thin edge of the semi-lenses of the two cameras in the direction which will produce a bending contrary to that of the semi-lenses of the stereoscope.

Having shown how the lateral proportional distances of any two correspondent points of the two stereoscopic pictures are the indices of their perspective distances, if we were, while looking in the stereoscope, to produce a change in those proportional lateral distances by sliding horizontally in a contrary direction, two pairs of superposed glass photographic pictures, the objects would appear to move, not in the horizontal lateral direction of that change which they naturally have, but in a straight line forward and backward, as if the object was approaching or receding.

But the most curious effect of that motion would be, that the objects would appear increasing in size while they were receding, and diminishing while approaching, which we know is contrary to the rule of perspective. This is another illusion entirely physiological, and the cause of which may be thus explained; while the object appears moving forward and backward it remains always the same size, but as we expect when it moves forward that it should increase in size, and when it moves backward that it should decrease, and as it does not, we feel that it is diminishing when approaching and increasing when receding.

PATENTS SEALED TO JANUARY 23, 1857.

November 24, 1856.

2224. THOMAS WALLACE, of Limehouse, for wheels, axles, and axleboxes.—Dated September 22, 1856.

2267. FREDERICK RANSOME, of Ipswich, for the manufacture of artificial stone, and in rendering it and other building materials less liable to decay.—Dated September 27, 1856.

2319. GEORGE FERGUSSON WILSON and ALEXANDER ISAAC AUSTEN, Vauxhall, for soap.—Dated October 3, 1856.

2330. MARIA FARINI, of Hanway-street, Oxford-street, for tooth powder.—Dated October 4, 1856.

2333. JOHN GEDGE, of 4, Wellington-street, South, Strand, for the preparation of rocky substances for obtaining mineral manure.—Dated October 6, 1856.—(A communication.)

2348. GEORGE FERGUSSON WILSON, of Vauxhall, for the manufacture of rosin oil.—Dated October 7, 1856.

2368. WILLIAM NAIRNE, of Alberdalgie, for machinery for preparing flax, tow, and other fibrous substances.—Dated October 9, 1856.

2390. GUSTAV SCHEURMANN, of Newgate-street, for printing music when type is employed.—Dated October 11, 1856.

2391. LEOPOLD ADOR and EDOUARD ABBADIE, of Paris, for the manufacture of colours from metals, and in the furnaces or apparatus for the same.—Dated October 11, 1856.

2471. JOHN SHAW, Manager, of Banbury, for preparing the food of cattle.—Dated October 21, 1856.

2500. WILLIAM WOODFORD, of Taunton, for the prevention or cure of smoky chimneys.—Dated October 24, 1856.

December 30, 1856.

1537. FREDERICK GEORGE SANDERS, of Poole, for the manufacture of ornamental floor and other tiles, bricks, slabs, and other similar articles.—Dated July 1, 1856.

1528. ALFRED WILD, of Windsor, for the manufacture of boots and shoes.—Dated July 1, 1856.

1539. JOHN COOPE HADDAN, of Cannon-row, for the manufacture of projectiles, and in firing and discharging them from cannon.—Dated July 1, 1856.

1540. JAMES ATKINSON LONGRIDGE, of 17, Fludyer-street, Westminster, for the application of mechanical power to ploughing and other field operations of agriculture.—Dated July 1, 1856.

1545. GEORGE TOMLINSON BOUSFIELD, of Sussex-place, Loughborough-road, for propelling and steering vessels when the force of water is used.—Dated July 1, 1856.—(A communication.)

1569. EDWIN GREENSLADE BRADFORD, of Torquay, for an improved rudder.—Dated July 4, 1856.

1624. WILLIAM ROBERTSON, of Manchester, for machines for spinning and doubling cotton and other fibrous substances, such machines being of the kinds commonly known as mules and twiners or doublers, and in the means of weighting rollers in the same and other machinery.—Dated July 9, 1856.

1635. JOHN FOWLER, jun., of Havering, and WILLIAM WORBY, of Ipswich, for machinery for ploughing and tilling land by steam.—Dated July 10, 1856.

1665. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for apparatus for consuming smoke to be applied to lamps and gas burners.—Dated July 15, 1856.—(A communication.)

1670. HENRY TURNER, of Leeds, for cutting hides for making flexible pipes, and for certain other purposes.—Dated July 16, 1856.

1677. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for circular looms.—Dated July 16, 1856.—(A communication.)

1684. The Reverend GEORGE JACQUE, of Auchterarder, for the construction of stringed musical instruments.—Dated July 17, 1856.

1755. CHARLES BURTON, of Regent-street, for warming houses and other buildings.—Dated July 24, 1856.

1766. EDWARD LORD, THOMAS LORD, ABRAHAM LORD, and WILLIAM LORD, of Todmorden, for machinery for opening, blowing, scutching, and preparing cotton and other fibrous substances.—Dated July 25, 1856.

1768. THOMAS BYFORD, of Carlton Villas, for horses' bits.—Dated July 25, 1856.

1769. ROBERT STEWART, of Glasgow, for cutting stone and other mineral substances.—Dated July 25, 1856.

1794. WILLIAM EDWARD NEWTON, of Chancery-lane, for a process of generating illuminating gas.—Dated July 29, 1856.—(A communication.)

1818. ALEXANDRE TOLHAUSEN, of Duke-street, Adelphi, for a new and improved flexible pocket umbrella, being likewise applicable to common and other sticks, canes, &c.—Dated August 1, 1856.—(A communication.)

1943. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, for steam-engines.—Dated August 20, 1856.—(A communication.)

1948. JULES LALEMAN, of Lille, France, for machinery for combing flax and other similar fibrous materials.—Dated August 20, 1856.

2153. KNOWELDEN, of Southwark, for the arrangement of valves and apparatus for preventing steam-boiler explosions.—Dated September 15, 1856.

2168. ROBERT MUSHET, of Coleford, for the manufacture of iron.—Dated September 16, 1856.

2170. ROBERT MUSHET, of Coleford, for the manufacture of iron.—Dated September 16, 1856.

2329. WALMSLEY PRESTON, of Over Darwen, for machinery to be used in the manufacture of paper hangings.—Dated October 4, 1856.

2363. WILLIAM STETTINIUS CLARK, of High Holborn, for the construction of churns for producing butter.—Dated October 9, 1856.—(A communication.)

2367. CHARLES BURTON, of Regent-street, for machinery for washing and cleansing fabrics and clothes.—Dated October 9, 1856.

2402. SAMUEL BREMNER, of Newcastle-upon-Tyne, for pouches or envelopes, and in machinery or apparatus for manufacturing or producing the same.—Dated October 14, 1856.

2428. GEORGE WILSON, of Glasgow, for power looms.—Dated October 17, 1856.

2443. LEON JOSEPH POMME DE MIRIMONDE, of Paris, for reducing the friction of axles and axletrees of carriages on railways.—Dated October 18, 1856.

2455. ROBERT GEORGE BARROW, of Wade-street, Poplar, for a self-maintaining motive power, obtained from water, air, or any other fluid or liquid.—Dated October 20, 1856.

2462. HENRY DEACON, of Hans-place, Chelsea, for suspending carriage bodies.—Dated October 20, 1856.

2486. GEORGE EDWARD JOHNS, of Falcon-street, for the application and adaptation of an optical or stereoscopic arrangement in the manufacture of boxes.—Dated October 23, 1856.

2556. CHARLES AUGUSTUS FERGUSON, of Millwall, Poplar, for preparing timber for ship-building, mast-making, and other purposes.—Dated October 31, 1856.

January 2, 1857.

1570. THOMAS CHANDLER, of Paradise-street, Rotherhithe, for a lever cask stand.—Dated July 4, 1856.

1574. LOUIS CORNIDES, of Trafalgar-square, for cementing and uniting together plain or ornamented surfaces of glass, or in uniting surfaces of glass to surfaces of metal or other material.—Dated July 4, 1856.

1575. EDWIN TRAVIS, of Oldham, and JOSEPH LOUIS CASARTELLI, of Manchester, for steam-engines.—Dated July 5, 1856.

1579. JAMES ALEXANDER MANNING, of the Inner Temple, Esquire, for the manufacture or production of manure.—Dated July 5, 1856.

1597. EDWARD CHARLES HEALEY, of Old Brompton, and EDWARD ELLIS ALLEN, of the Strand, for preparing for use veneers, paper, and other fabrics, or sheets made of fibres.—Dated July 7, 1856.

1636. STEPHEN MARTIN SAXBY, of Rock Ferry, for ascertaining the errors of mariners' compasses.—Dated July 10, 1856.

1651. JOHN AVERY, of Essex-street, Strand, for an improved "plate-holder" for photographic and other purposes.—Dated July 12, 1856.—(A communication.)

1686. ALFRED VINCENT NEWTON, of Chancery-lane, for a regulator for heating apparatus.—Dated July 17, 1856.—(A communication.)

1702. WILLIAM NOTON, of Oldham, for self-acting mules, and other machines of the like nature, for spinning and doubling.—Dated July 19, 1856.

1738. JOHN BRAYSHAY, of Cinderhill, Ringley-bridge, for boilers for generating steam.—Dated July 23, 1856.

1810. WILLIAM EDWARD NEWTON, of Chancery-lane, for a process for obtaining aluminium.—Dated July 31, 1856.—(A communication.)

1964. FREDERICK ALBERT GATTY, of Accrington, for dyeing.—Dated August 23, 1856.

1976. MARC ANTOINE FRANÇOIS MENNONS, of Rue Napoléon, Montmartre, for a new composition applicable to the coating or covering of metallic and non-metallic surfaces.—Dated August 25, 1856.—(A communication.)

2169. ROBERT MUSHET, of Coleford, for the smelting of iron ores.—Dated September 16, 1856.

2290. PIERRE ARMAND LE COMTE DE FONTAINEMOREAU, of Paris, and South-street, London, for a voltaic battery.—Dated October, 1, 1856.—(A communication.)

2578. SAMUEL MIDDLETON, of Porter-street, Newport-market, for the manufacture of certain articles of leather without seams.—Dated November 3, 1856.

2584. JOSHUA MURGATROYD, of Stockport, for machinery or apparatus for spinning, cleaning, doubling, and throwing silk, part of which improvements are applicable to machinery for roving and doubling cotton and other fibrous substances.—Dated November 4, 1856.

January 6, 1857.

1602. JOSEPH HENRY GEORGE WELLS, of Essex-street, Strand, for pistons for steam and other motive-power engines and pumps in general, and which improvements are also applicable to stuffing boxes.—Dated July 8, 1856.—(A communication.)

1603. JOSEPH HENRY GEORGE WELLS, of Essex-street, Strand, for governors or regulators.—Dated July 8, 1856.—(A communication.)

1610. Abraham Herts, of Bunhill-row, Finsbury, for an improved sheet metal bending and tubing machine.—Dated July 8, 1856.—(A communication.)

1620. Ward Holroyd, and William Noble, of Queen's Head, near Halifax, for machinery or apparatus for cutting wood and stone. —Dated July 9, 1856.

1622. Timothy Jerome, of Birmingham, for buttons for ornamenting and fastening dresses, as also in loops for attaching or holding buttons on garments while in use.—Dated July 9, 1856.

1642. Jean Baptiste Desire Chevalier and Narcisse Rabouin O'Sullivan, of Paris, for obtaining or preparing printing surfaces and in printing therefrom.—Dated July 11, 1856.

1645. Benoit Frederic Ortet, of Rue de l'Echiquier, Paris, and of South-street, London, for a new metallic composition applicable to the coating of surfaces and to the moulding and casting of various objects.—Dated July 12, 1856.

1671. James Ford, of Preston, and Peter Knowles, of Bolton-le-Moors, for machinery for cleaning and preparing cotton and other fibrous substances.—Dated July 16, 1856.

1681. Henry Bragg, of Belfast, for improvements in drying air, and in machinery for stretching, drying, and finishing fabrics.—Dated July 17, 1856.

1694. Peter Hubert Desvignes, of Lewisham, for machinery for scutching or beating flax, hemp, and other fibrous materials requiring like treatment.—Dated July 18, 1856.

1696. William Beevers Birkby, of Cleckheaton, near Leeds, for filleting and fixing pointed teeth in the fillets used in the preparation of flax, tow, hemp, and other fibrous substances.—Dated July 18, 1856.

1703. James Ryder and Daniel Bentley, of Bolton-le-Moors, for machinery and apparatus for folding and measuring fabrics.—Dated July 19, 1856.

1710. Edward William Young, of Rochester, for the construction of Bridges.—Dated July 19, 1856.

1731. Elias Weisskopf, of Pesth, in Hungary, and South-street, London, for an artificial combustible chiefly applicable to the kindling of fires.—Dated July 22, 1856.

2069. Ralph Reeder, of Cincinnati, America, for an improved universal dial and chronometer compass.—Dated September 5, 1856.

2076. Sidney Wesley Park and Edgar Stimpson Ells, of Troy, U. S. A., for machinery for knitting tubular ribbed fabrics.—Dated September 6, 1856.

2156. Calvin Kline, of Brooklyn, U. S. A., for the improvement of mariners' and other compasses by which the effect of local attraction is cut off or neutralized, and the compass is made to traverse more perfectly.—Dated September 15, 1856.

2544. Charles De Jongh, of Lautenbach, France, for an improved method of and machinery for combing and preparing silk, flax, and other fibrous substances.—Dated October 29, 1856.

2586. Ethan Campbell, of Boston, U. S. A., for a new and useful or improved apparatus for propelling a navigable vessel.—Dated November 4, 1856.

2614. William Henry Olley, of Brabant Court, London, for obtaining photographic impressions, or pictures of microscopic objects. —Dated November 6, 1856.

2616. PETER CATO, JOHN MILLER, jun., and JOHN AUDLEY, of Liverpool, for the manufacture of ships' knees.—Dated November 6, 1856.

2619. HENRY DIRCKS, of Moorgate-street, London, for the preparation and application of the materials for making worts and washes in brewing, distilling, and like operations, and in the apparatus connected with the same.—Dated November 7, 1856.

2627. GEORGE BERTRAM, of Edinburgh, and WILLIAM MCNIVEN, of Polton Mill, Lasswade, for the manufacture of paper.—Dated November 8, 1856.

2629. WILLIAM PORTER, of Lansdowne Villas, Brompton, Middlesex, for the grinding of cements and other substances, and in the construction of millstones for the same.—Dated November 8, 1856.

January 9, 1857.

1626. MOSS DEFRIES, of Houndsditch, for moderator and other lamps.—Dated July 9, 1856.

1631. JOHN MARSH, of Nottingham, and JOHN CATT, of Stepney, for the manufacture of certain textile fabrics.—Dated July 10, 1856.

1633. SAMUEL HARDACRE, of Miles Platting, Lancaster, for a compound conical spike and spiral double gridded machine for opening, blowing, scutching, and cleaning cotton, wool, and other fibrous substances.—Dated July 10, 1856.

1639. JOHN WESTWOOD, of Walsall, for hand, roof, and other railway lamps, parts of which are also applicable to certain descriptions of oil lamps for general purposes.—Dated July 11, 1856.

1643. EDWARD HENRY CRADOCK MONCKTON, of Regent-street, for the application of a means or process for destroying grubs and other insects, or animalculæ, or infusoria, injurious to plants.—Dated July 11, 1856.

1646. THOMAS MADELY HARTWELL, JAMES WILLIAM GLADWIN, and HENRY GLADWIN, of Manchester, for machinery or apparatus for stretching woven fabrics.—Dated July 11, 1856.

1657. WILLIAM WILLIAMS, of Dale, Pembroke, for cutting and dressing stone by machinery.—Dated July 14, 1856.

1697. JOHN HAMILTON, of Liverpool, for bending sheet iron for the manufacture of conical tubes.—Dated July 18, 1856.

2165. GEORGE TOMLINSON BOUSFIELD, of Brixton, for power looms for weaving wire cloth.—Dated September 16, 1856.—(A communication.)

2293. JOHN DAUGLISH, of Great Malvern, for making bread.—Dated October 1, 1856.

2359. PETER WARD, of Liverpool, for composition for coating the bottoms of ships.—Dated October 8, 1856.

2365. JAMES ATKINSON LONGRIDGE, of Fludyer-street, Westminster, and THOMAS RICHARDSON, of Newcastle-upon-Tyne, for constructing the fire boxes of locomotive steam boilers.—Dated October 9, 1856.

2376. WILLIAM JOHNSON, of Lincoln's-inn-fields, for railway brakes.—Dated October 10, 1856.—(A communication.)

2463. WILLIAM CLAY, of Liverpool, and JOSIAH HARRIS, of Dolgelly, for the manufacture of iron and steel.—Dated October 20, 1855.

2493. JOHN DEARMANN DUNNICLIFF, and WALTER DEXTER, of Hyson Green, for warp machinery.—Dated October 23, 1856.

2595. WILLIAM EDWARD WILEY, of Birmingham, for pen-holders, —Dated November 5, 1856.

2597. JAMES FERNIHOUGH, of Dukinfield, and ROBERT FARROW, of Leek, for a self-acting apparatus for regulating the supply of atmospheric air to furnaces, gas stoves, and other closed vessels used for the consumption of fuel or combustible gases, by preventing the formation of smoke therefrom, and thereby economising such fuel or combustible gases.—Dated November 5, 1856.

2664. WILLIAM HENRY BALMAIN, and THOMAS COLBY, of Saint Helen's, for grinding various substances.—Dated November 12, 1856.

January 14, 1857.

1654. CHARLES BURRELL, of Thetford, for arranging and rendering portable apparatus suitable for distilling from beet-root, and other vegetable substances.—Dated July 14, 1856.—(A communication.)

1660. WILLIAM CLIBRAN and JOSEPH CLIBRAN, of Manchester, for apparatus or mechanism for regulating and measuring gas.—Dated July 15, 1856.

1661. WILLIAM WATT, of Belfast, for the manufacture of starch.—Dated July 15, 1856.

1673. RICHARD MORGAN, of Acton, for a pocket-case for containing address cards, stamps, and other similar articles.—Dated July 16, 1856.

1674. THOMAS DUNCAN, of Liverpool, for a combined and compound engine for applying motive power, and for measuring fluids.—Dated July 16, 1856.

1690. WILLIAM LEUCHARS, of Piccadilly, for locks for travelling bags.—Dated July 18, 1856.

1692. GEORGE FREDERICK HIPKINS, and JOHN BRITTEN, of Birmingham, for applying springs or weights for the purpose of closing doors or resisting shocks, strains, or pressure.—Dated July 18, 1856.

1720. ROBERT RICHARDSON, of Great George-street, Westminster, and JONATHAN EDWIN BILLUPS, of Llanelly, for improvements in the permanent way of railways.—Dated July 21, 1856.

1732. CHARLES COWPER, of Southampton-buildings, Chancery-lane, for lighting and extinguishing gas lights.—Dated July 22, 1856.—(A communication.)

1746 GILES MABIE, of Rockford, U. S. A., and of Paris, for machinery for mowing and reaping.—Dated July 23, 1856.—(A communication.)

1761. JOSHUA MATHER and WILLIAM FORSHAW, of Bolton-le-Moors, for pickers for looms and apparatus connected therewith.—Dated July 24, 1856.

1762. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for grindstones.—Dated July 24, 1856.—(A communication.)

1779. RICHARD CLARKE PAULING, of Great George-street, Westminster, for giving increased buoyancy to ships and vessels, in raising sunken vessels, in keeping structures water-tight, and in propelling vessels.—Dated July 26, 1856.

1782. GEORGE COLLETON COOKE, of Lombard-street, for stereoscopes.—Dated July 26, 1856.

1800. HENRI EVETTE, of Lizieux, France, for looms for weaving. —Dated July 30, 1856.

1811. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for carriages and waggons.—Dated July 31, 1856.—(A communication.)

1812. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for an improved auger or boring tool.—Dated July 31, 1856.—(A communication.

1942. ANTHONY CHARLES VETTER DE DOGGENFIELD, of Brixton, for glass ornaments for ornamenting gardens, summer-houses, dinner and other tables, and for other ornamental or decorative purposes.—Dated August 19, 1856.

2545. PETER FAIRBAIRN, of Leeds, and ROBERT NEWTON, of Liverpool, for machinery for dressing waste silk.—Dated October 29, 1856.

2567. JOHN YOUNG, of Wolverhampton, for improvements in flooring cramps and lifting jacks.—Dated November 1, 1856.

January 16, 1857.

1675. DAVID BOWLAS, of Reddish, for "throstles" and doubling frames for spinning and doubling cotton and other fibrous materials. —Dated July 16, 1856.

1706. JOHN WHITEHOUSE, jun., of Birmingham, for making, mounting, and spindling knobs, applicable for doors and other purposes.—Dated July 19, 1856.

1708. WILLIAM ASTBURY JUMP, of Moulton, for apparatus for supplying with fuel the furnaces of steam boilers and other furnaces, and in the method of cleaning the fire-bars thereof.—Dated July 19, 1856.

1709. JOHN SMITH, of Oldham, and ENOCH HARRISON, of Manchester, for machinery or apparatus for warping and beaming.—Dated July 19, 1856.

1715. ELIAS LEAK, of Longton, for a thimble pillar with points and branches, to be used in placing "glost" china and earthenware in ovens and kilns when firing, burning, or baking such ware, in lieu of the cockspurs and stilts now in use for that purpose.—Dated July 21, 1856.

1718. JOHN PURSLOE FISHER, of Edgbaston, for cues used at billiards, bagatelle, and other similar games.—Dated July 21, 1856.

1724. WILLIAM GREEN, of York-street, City-road, for treating, ornamenting, and waterproofing fabrics, and in machinery or apparatus for effecting the same.—Dated July 21, 1856.

1734. HENRY HINDLE, of Ashton-under-Lyne, for valves and apparatus for governing steam engines and for increasing the safety of steam boilers.—Dated July 22, 1856.

1749. JOHN DERBYSHIRE, of Longton Potteries, for cocks, taps, and valves.—Dated July 23, 1856.

1804. JOSEPH HOPWOOD, of Bolton-le-Moors, for machinery for measuring and folding fabrics.—Dated July 31, 1856.

1805. GEORGE HOLCROFT, of Manchester, and PETER JOHNSON, of Wigan, for the manufacture of cement, and in the application of a known material to cementing purposes.—Dated July 31, 1856.

1813. PIERRE MARIE JOSEPH CHAMBLANT, of Paris, for the manufacture of glass.—Dated July 31, 1856.

1822. JOHN AVERY, of Essex-street, Strand, for bonnets and other coverings for the head.—Dated August 1, 1856.—(A communication.)

1824. RICHARD ALBERT TILGHMAN, of Philadelphia, U. S. A., for hydro-extractors or centrifugal machines.—Dated August 1, 1856.

1825. Robert Reeves, of Westbury, for machinery for sowing or depositing seeds and manure.—Dated August 1, 1856.

1828. Richard Archibald Brooman, of Fleet-street, for the manufacture of artificial fuel.—Dated August 6, 1856.—(A communication.)

1829. Thomas Donkin, of Bermondsey, for the glazing of paper.—Dated August 2, 1856.—(A communication.)

1830. Josiah Rhodes, of Nottingham, for machinery or apparatus for reducing turnips and other vegetable substances to a pulpous state.—Dated August 2, 1856.

1840. Henry Walker Wood, of Briton-ferry, Glamorganshire, for the manufacture of fuel, and for a new mode of preserving coal and coke and other fuel.—Dated August 5, 1856.

1944. John Henry Johnson, of Lincoln's-inn-fields, for roller fulling mills.—Dated August 20, 1856.—(A communication.)

1967. John Henry Johnson, of Lincoln's-inn-fields, for stocking looms.—Dated August 23, 1856.—(A communication.)

2015. John Henry Johnson, of Lincoln's-inn-fields, for fire-arms.—Dated August 30, 1856.—(A communication.)

2501. Robert Struthers, of Holyhead, for machinery or apparatus for transmitting motive power.—Dated October 24, 1856.

2539. Thomas Clutton Salt, of Birmingham, for a new or improved method of coating with glass or enamelling surfaces of cast iron.—Dated October 29, 1856.

2703. Robert Mushett, of Coleford, for the manufacture of iron.—Dated November 15, 1856.

2748. Thomas Francis Joyce, of Birmingham, for joining, supporting, and strengthening the rails of railways.—Dated November 20, 1856.

2773. Edward Tucker, of Belfast, for preparing and drying glue and gelatinous matter.—Dated November 22, 1856.

January 20, 1857.

1716. Marc Antoine Augustin Gaudin, Chemist, and Eugene Xavier Choumara, of Paris, for manufacturing factitious wholesome milk.—Dated July 21, 1856.

1717. Francis Barbour, of Manchester, for penholders.—Dated July 21, 1856.—(A communication.)

1719. James Clark, of Manchester, for the manufacture of waterproof fabrics.—Dated July 21, 1856.

1722. Frederick Simpson, of Redhill, for an improved mode of stopping bottles.—Dated July 21, 1856.

1723. Maurice Vergnes, of New York, U. S. A., for electro galvanic machines for producing motion by galvanic electricity.—Dated July 21, 1856.

1737. James Clark, of Manchester, for the manufacture of beds, mattresses, cushions, and seats.—Dated July 22, 1856.

1739. George North, of Greenwich, for a spring catch for the security of jewellery and articles of personal ornament and general utility.—Dated July 23, 1856.

1759. George Alexander Copeland, of Constantine, near Falmouth, for a safety blasting cartridge for the use of miners and quarrymen.—Dated July 24, 1856.

1760. Charles Tiot Judkins, of Fleet-street, London, and Manchester, for an improved gas-regulator.—Dated July 24, 1856.

1780. James Dickinson, of Liverpool, for anchors and in the manufacture of the same.—Dated July 26, 1856.

1835. Charles Theodule Launay and Jules Chopin, of Paris, for increasing the illuminating power of gas.—Dated August 4, 1856.

2399. John Stephen, of Glasgow, for steam boilers and furnaces. —Dated October 13, 1856.

2404. Thomas Stokes Cressey, of Homerton, for machinery for cutting, hollowing, and backing staves.—Dated October 14, 1856.

2439. Frederick Arthur Magnay, of Norwich, and Ralph Radcliffe Whitehead, of Saddleworth, for damping paper for printing.—Dated October 17, 1856.

2589. Samuel Cotton, of Broughton, for an improved mode or method of regulating or governing lift, tilt, or other hammers worked by mechanical power.—Dated November 4, 1856.

2722. Frederick Arthur Magnay, of Norwich, for damping paper for printing.—Dated November 18, 1856.

January 23, 1857.

1741. Ferdinand Potts, of Birmingham, for tags for stay and other laces, as also in the machinery for forming and finishing the same.—Dated July 23, 1856.

1742. John Onions, of Wellington-place, Blackfriars-road, Southwark, for the manufacture of iron.—Dated July 23, 1856.

1748. Henry Doubleday, of Coggeshall, for the manufacture of starch.—Dated July 23, 1856.

1754. James Ashman, of Swansea, for the manufacture of artificial limbs.—Dated July 24, 1856.

1758. George Collier and John Crossley, of Halifax, and James William Crossley, of Brighouse, for finishing and stretching woven fabrics.—Dated July 24, 1856.

1770. Thomas Wrigley, of Bury, for machinery or apparatus for cleaning "cotton waste" or other materials used in the manufacture of paper.—Dated July 25, 1856.

1772. Samuel Jay and George Smith, of Regent-street, for stuffing or padding couches, cushions, bedding, chairs, and other similar articles.—Dated July 25, 1856.

1776. Julien Denis, of Queenhithe, for cutting or perforating steel and other metals.—Dated July 25, 1856.—(A communication.)

1778. Charles Hodges, of Manchester, for apparatus for unwinding silk, thread, or yarn from the hank.—Dated July 26, 1856.

1783. Henry Remington, of Camberwell, for an improved gas heating and cooking apparatus.—Dated July 26, 1856.

1857. William Hall, Elisha Wylde, and William Waite, of Birmingham, for steam engines.—Dated August 6, 1856.

1884. Peter Armand le Comte de Fontainemoreau, of Paris, and of South-street, Finsbury, for a new electro-motive engine.—Dated August 11, 1856.—(A communication.)

1896. William Church and Henry Whiting Hamlyn, of Birmingham, for a method or methods of constructing or building hay and other ricks.—Dated August 13, 1856.

1920. Philippe Pierre Hoffmann, of Strasbourg, for a compound

to be used for waterproofing fabrics, paper, leather, or other materials.—Dated August 16, 1856.

2482. GEORGE CHAPPELL POTTS, of New Oxford-street, for the application of certain materials to the cleaning of casks.—Dated October 22, 1856.

2758. CHARLES TOOTH, of Burton-upon-Trent, for charging or filling and filling up casks or other vessels for containing fermenting liquids.—Dated November 21, 1856.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(*To the* 20*th January*, 1857, *inclusive.*)

3000. THOMAS SYMES PRIDEAUX, of St. John's Wood, for apparatus for regulating the supply of air to furnaces, and for preventing radiation of heat from fire-doors and other parts of the fronts of furnaces.—Dated December 27, 1853.

3026. HENRI CATHERINE CAMILLE DE RUOLZ and ANSELME DE FONTENAY, of Paris, for a metallic alloy.—Dated December 30, 1853.

3028. WALTER MABON, of Manchester, for machines used for rivetting together metallic plates.—Dated December 30, 1853.

16. THOMAS MANN, of Horsham, for a cinder-sifting shovel.—Dated January 3, 1854.

33. JOHN HEALEY, of Bolton-le-Moors, for spinning machines known as mules, and in machines of similar character.—Dated January 6, 1854.—(A communication.)

2996. EDWARD JOSEPH HUGHES, of Manchester, for sewing machines.—Dated December 27, 1853.—(A communication.)

3002. JOHN PARKINSON, of Bury, for governors for regulating the pressure of steam, gas, and other fluids or liquids.—Dated December 28, 1853.

3020. CLAUDE ALPHONSE ROUX, of Belleville, Paris, and Castle-street, Holborn, for printing warps of cut-pile and similar fabrics.—Dated December 29, 1853.

3039. JULIAN BERNARD, of Regent-street, for stitching and ornamenting various materials, and in machinery and apparatus connected therewith.—Dated December 31, 1853.

10. DAVID KENNEDY, of Reading, U.S., for compositions of matter to be used in the manufacture of leather.—Dated January 3, 1854.

17. JULIAN BERNARD, of Regent-street, for the manufacture of boots and shoes, part of such improvements being applicable to the manufacture of garments.—Dated January 3, 1854.

38. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for dyeing, washing, and bleaching fabrics.—Dated January 7, 1854.—(A communication.)

22. EDWARD SCHISCHKAR, of Halifax, and FREDERICK CRACE

CALVERT, of Manchester, for dyeing and printing textile fabrics and yarns.—Dated January 5, 1854.

26. LEON JOSEPH POMME, of Paris, for reducing the friction of axles and axletrees of carriages.—Dated January 5, 1854.

3. ALFRED DAWSON, of Barnes-place, Mile-end-road, for converting small coal or coal dust, or small coal and coke, into solid blocks of fuel.—Dated January 2, 1854.

27. JOHN MASON and LEONARD KABERRY, of Rochdale, for machinery or apparatus for preparing cotton-wool and other fibrous materials for spinning.—Dated January 5, 1854.

30. HENRY HIND EDWARDS, of Ludgate-hill, for treating peat and vegetable matters, for the purpose of fuel, as well as in the extraction of other useful products therefrom.—Dated January 6, 1854.—(A communication.)

8. HENRY LEE CORLETT, of Summer-hill, Dublin, for caoutchouc springs for locomotive engines and tenders, railway carriages and waggons.—Dated January 3, 1854.

11. JAMES STOVOLD, of Barnes, for machinery or apparatus for sifting and washing gravel or other similar substances.—Dated January 3, 1854.

19. DAVID HULETT, of High Holborn, for gas regulators for regulating the supply of gas to the burner.—Dated January 4, 1854.—(A communication.)

224. BENJAMIN O'NEALE STRATFORD, Earl of Aldborough, of Stratford Lodge, Ireland, for aërial navigation.—Dated January 30, 1854.

962. ANDREW WHITE GIBSON, of Edinburgh, for mills for the manufacture of barley and rice.—Dated April 28, 1854.

47. RICHARD ALBERT TILGHMAN, of Philadelphia, U. S. A., for treating fatty and oily matters, chiefly applicable to the manufacture of soap, candles, and glycerine.—Dated January 9, 1854.

70. MARCEL VETILLART, of Le Mans, France, for drying woven fabrics, yarns, and other goods.—Dated January 11, 1854.

101. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, for the manufacture of candles and night lights.—Dated January 16, 1854.

102. GEORGE FERGUSSON WILSON, of Belmont, Vauxhall, for treating castor oil and obtaining products therefrom.—Dated January 16, 1854.

39. ANTHONY BERNHARD BARON VON RATHEN, of Wells-street, for improvements in chimneys and flues of houses, and in stoves to be employed therewith, whereby better draught will be obtained, consumption of fuel will be diminished, smoke, fog, and night damp will be prevented from entering apartments, more warmth will be thrown out, and whereby fire in the chimney can be readily extinguished.—Dated January 7, 1854.

48. RICHARD HUSBAND, of Manchester, for ventilating hats or other coverings for the head.—Dated January 9, 1854.

45. BENJAMIN BURLEIGH, of the Great Northern Railway, for railway switches and chairs.—Dated January 9, 1854.

53. The Reverend WILLIAM RENWICK BOWDITCH, of Wakefield, for the purification of gas, and in the application of the materials employed therein.—Dated January 10, 1854.

60. ADOLPHE DREVELLE, of Halifax, for a new combing machine suitable for any textile or fibrous matter.—Dated January 10, 1854. —(A communication.)

67. Felix Lieven Bauwens, of Pimlico, for treating fatty matters previous to their being employed in the manufacture of candles.—Dated January 11, 1854.

109. Henry Holland, of Birmingham, for the construction of parts of umbrellas and parasols.—Dated January 17, 1854.

212. Josiah Latimer Clark, of Chester Villas, Islington, for apparatus for conveying letters or parcels between places by the pressure of air and vacuum.—Dated January 28, 1854.

325. Benjamin Hornbuckle Hine and Anthony John Mundella, of Nottingham, and Luke Barton, of Hyson-green, for the manufacture of knitted fabrics.—Dated February 10, 1854.

365. Benjamin Hornbuckle Hine, Anthony John Mundella, and William Onion, of Nottingham, for machinery for the manufacture of textile and looped fabrics.—Dated February 15, 1854.

180. William Massey, of Hemer-terrace, Liverpool, for artificial teeth and gums.—Dated January 24, 1854.

98. James Newall, of Bury, for machinery or apparatus for stopping or retarding the progress of railway and other carriages, and in the mode or method of connecting two or more carriages with the said apparatus together.—Dated January 16, 1854.

111. Henry Corlett, of Summer-hill, Dublin, for springs for railway and other carriages and vehicles.—Dated January 17, 1854.

113. Bevan George Sloper, of London, for machinery or apparatus for separating gold from earthy matters.—Dated January 17, 1854.

115. Edward Lord, of Todmorden, for looms for weaving.—Dated January 18, 1854.

121. Edmund Sharpe, of Swadlincote Potteries, Burton-on-Trent, for apparatus used for sifting clay.—Dated January 18, 1854.

135. Charles William Rowley Rickard, of Great Charlotte-street, Blackfriars-road, for cocks and taps.—Dated January 19, 1854.

126. George Henry Bursill, of Offord-road, Islington, and of Pimlico, for operating upon metalliferous ores and other minerals, and upon "slags" and "sweep," in order to facilitate the separation and recovery of the metals and other products, also in machinery or apparatus for effecting such improvements, which is in part applicable to other purposes.—Dated January 19, 1854.

129. John Norton, of Cork, for effecting communications between the different parts of railway trains.—Dated January 19, 1854.

142. Robert Angus Smith, and Alexander McDougall, of Manchester, for treating, deodorizing, and disinfecting sewage and other offensive matter, which said improvements are also applicable to deodorizing and disinfecting in general.—Dated January 20, 1854.

150. Cyprien Marie Tessie du Motay, of Paris, for the manufacture of oil from resin.—Dated January 21, 1854.

153. Peter Spence, of Pendleton, for manufacturing the prussiates of potash and soda.—Dated January 21, 1854.

183. John Bird, of Kingswinford, for kilns for burning bricks and other articles.—Dated January 24, 1854.

226. Richard Garrett, of Saxmundham, Suffolk, for thrashing-machines.—Dated January 30, 1854.

251. Alfred Vincent Newton, of Chancery-lane, for the manufacture of cannon.—Dated January 30, 1854.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 3. Vol. XXIX. ENLARGED SERIES.—MARCH, 1857.

Specification of the Patent granted to JAMES WEBSTER, *of Birmingham, in the County of Warwick, Engineer, for A New or Improved Elastic Metallic Tube, and the Method of Manufacturing the same.*—Dated April 5, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consist,—

Firstly, of a tube made of brass, copper, or other metal or alloy, in which a series of corrugations are made in planes perpendicular to the axis of the tube. The said corrugations give elasticity to the said tube, and permit of its flexure within certain limits. I do not confine myself to any particular figure of the said corrugations, but I prefer to make them as deep as is compatible with the nature of the metal or alloy of which the tube is made, and so narrow that the shoulders between the corrugations shall touch each other on slight flexure of the tube.

Figs. 1, 2, and 3, illustrate the stages through which a plain or cylindrical tube passes in being converted into my

improved elastic tube. The plain or cylindrical tube is first impressed or corrugated, in the manner represented in fig. 1. The corrugations are afterwards deepened, as represented in fig. 2, and the tube is further compressed longitudinally, and the corrugations still further deepened, as represented in fig. 3. When the tube is only to be subjected to slight flexure it may be left in the state represented in fig. 1. Where greater elasticity is required, the deepening and narrowing of the corrugations may be carried to either of the stages represented in figs. 2 and 3.

I manufacture the elastic tube, figs. 1, 2, and 3, by means of the machinery represented in side elevation in fig. 4, and in transverse section in fig. 5. The said machinery constitutes the second part of my invention. A piece of ordinary cylindrical tubing, *a*, is fixed at one end to the sliding shaft or axis, *b*, and at its other end to the axis of the lathe head, *c*. The manner of attaching the tube is as follows:—*d*, is a conical plug affixed to the end of the axis, *b*; the plug, *d*, is forced into the end of the tube, *a*, and the collar, *e*, is screwed upon the plug, *d*, as represented; the end of the tube, *a*, is thereby grasped firmly between *d* and *e*; that end of the tube which is fixed to the axis, *c*, is secured in a similar manner. A series of rolls, *f*, *f*, *f*, are placed loosely upon axes, the said axes being supported on the arms, *g*, *g*, *h*, and *i*. The arms, *g*, *g*, and *h*, are jointed to the bed of the machine, and the arm, *i*, is jointed to the lever, *k*, on the axis, *l*. *m*, is a cross piece on the axis, *l*, to the vertical arms of which the arms, *g*, *g*, and *h*, are respectively connected by links, *n*, *o*; *p*, is an arm or lever fixed on the axis, *l*; *q*, *q*, are coiled springs, which, acting upon the arm or lever, *k*, depress the said arm or lever, *k*, and by producing partial rotation of the axis, *l*, cause the separation of the rolls, *f*, *f*, *f*. By pressing upon the arm or lever, *p*, the said rolls, *f*, *f*, *f*, are made to press at equidistant points upon the tube, *a*. A piece of plain tube being fixed in the machine, a rapid rotatory motion is given to the said tube, and the lever, *p*, depressed, so as to bring the rolls, *f*, *f*, *f*, to bear against the said tube, *a*. I first use rolls, *f*, *f*, *f*, of a form suitable to produce depressions similar to those represented in fig. 1; I afterwards deepen the depressions by the use of rolls narrower than those previously employed, which said rolls I place upon the axes, f^1, f^1, f^1. Although I prefer to use three sets of rolls, acting simultaneously and at equidistant points

upon the tube, *a*, yet two, four, or other number of sets of rolls may be employed. As the corrugations are formed and deepened, the tube, *a*, shortens, and the axis, *b*, slides in its bearing, so that it may follow the tube in its contraction. *r*, is a helical or coiled spring, which, bearing against the cone, *d*, presses the said cone and axis, *b*, in the direction in which the tube contracts. The rolls, *f*, *f*, *f*, besides rotating upon their axes, are capable of sliding thereon, so as to follow the corrugations, in which they work, as the said corrugations approach nearer to each other. Instead of rolls, *f*, *f*, *f*, burnishers or fixed pressing tools may be employed to press upon the tube and form the depressions therein; I prefer, however, the use of rolls as described. Tubes made according to my invention are elastic both longitudinally and transversely, that is to say, they are capable of elongation and flexure, within certain limits, without taking a set. Tubes made according to my invention are suitable for effecting the junctions of pipes exposed to variable temperatures, or otherwise strained or required to bend, as in the couplings of locomotives with their tenders, hose for fire engines, and other like purposes.

Having now described the nature of my said invention, and the manner of carrying the same into effect, I wish it to be understood that I do not limit myself to the precise details herein described and represented, as the same may be varied without departing from the nature of my said invention;—

But I claim as my invention,

Firstly, the new or improved elastic metallic tube, hereinbefore described, and illustrated in the accompanying drawing, that is to say, a metallic tube having depressions or corrugations in planes at right angles to the axis of the said tube.

Secondly, the method of making my new or improved elastic tube, hereinbefore described, and illustrated in the accompanying drawing: that is to say, by the use of machinery in which rolls or fixed burnishers or pressing tools are made to bear upon and indent a rotating metallic tube. —In witness, &c.

JAMES WEBSTER.

Specification of the Patent granted to WILLIAM BALL, *of Chicopee, in the County of Hampden, State of Massachusetts, United States of America, for Improvements in Machines for Separating Copper and other Metals from their Ores.* —Dated March 27, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—

Fig. 1, is a plan of the machine;

Fig. 2, a vertical section through the same, upon the line, A^2, A^2;

Figs. 3, 4, 5, 6, details, which will be referred to hereafter.

In the process of washing pulverized ores by hand, the ore is agitated in a pan beneath a body of water, by which means it is kept partially suspended in the water near the bottom of the pan, the heavier or metallic particles sinking, and leaving the lighter ones above, still suspended in the liquid. The water is then poured off; but before this can be effected the agitation must be stopped, and the ore immediately settles, and thus but a small portion of it is carried off by the water; a fresh supply of water is then added, and the operations of shaking and pouring off are repeated until the metallic particles remain behind, measurably freed from the lighter or waste portion of the ore.

To perform this operation by machinery in such a manner that the overflowing of the water and the agitation shall be continuous, without the necessity of interrupting the one for the other, is the object of my invention. To accomplish this, I have contrived a machine in which the agitation is uninterrupted, and the lighter particles of the ore are permitted continually to flow off with a sufficient quantity of the water through suitable openings made for the purpose; but in order that these lighter particles of ore may be kept suspended at the level at which they are to flow off, a head of water is maintained considerably above this level, by throwing in an excess of water over and above what can escape at the openings through which the ore passes, and permitting this excess to overflow at a still higher point. The ore is thus kept suspended in the water at the level at which it is to flow off, which would

not be the case if the ore were permitted to flow over the top of the vessel with the whole of the water.

My invention, therefore, consists in permitting the water to flow from the trough at two different levels, each of them above that to which the metallic particles are allowed to settle, whereby a head of water is maintained entirely above the ore, which is thus kept loosened and suspended as required.

To enable others skilled in the art to make and use my invention, I will proceed to describe the method which I have adopted of carrying it out.

In the accompanying drawings, A, is the framework of the machine; B, is a vertical shaft suspended from the framework at *a*. This shaft does not revolve, but it sustains and carries all the operative parts of the machine, and vibrates with the troughs, I and M.

The apparatus for delivering the material to the machine will now be described. C, is the receiving basin, into which the pulverized material, together with the requisite quantity of water, is run; from this basin it escapes through the holes, *b*, into the basin, D, of the distributor immediately beneath; this latter communicates with the tubular conveyors, E, from the open ends, *c*, of which the sand and water are delivered. This tubular distributor is caused to rotate uniformly upon the shaft, B, in the following manner:—G, are the driving pulleys upon the shaft, F; this shaft carries a bevel pinion, *f*, which engages with the bevel wheel, *g*, upon the horizontal shaft, H. *i*, is a bevel pinion upon this shaft, which drives the bevel wheel, *h*, upon a short sleeve, *n*; this sleeve revolves loose upon the shaft, B, and has two projecting teeth, *m*, which enter slots in the top of a second sleeve, *d*, which latter rests upon the off-set, *c*, on the shaft, B, and revolves loosely thereon. In the centre of the distributor basin, D, is the hollow bearing, *l*, which embraces the sleeve, *d*, and is supported by the long washer or thimble, *p*, which rests upon the shoulder, *o*, of the sleeve. The receiving basin, C, in like manner is fitted to the hollow bearing of the distributor, and thus the distributor and the receiving basin are carried by the sleeve, *d*, and as the cog wheel, *h*, revolves, through the connexion of the parts, already explained, the distributor is also revolved, the friction of its bearings upon the sleeve, *d*, being sufficient to drive it. The pulverized ore and water as they fall from the orifices of the tubes, E, are

received by the annular trough, I, in which the first washing takes place.

The construction and operation of this trough, and the parts immediately connected therewith, will now be explained:—The bottom of this trough is of the form represented in section in fig. 2 at *k*; it rises to within an inch of the top of the trough at *q*. There is a slight perpendicular rise of a quarter of an inch at the point, *k*, not visible in fig. 2, on account of the smallness of the scale, but represented full size in fig. 4. *s*, are holes through the bottom of the interior of this trough, of a size dependent upon the nature and fineness of the material to be operated upon. Immediately beneath this trough, and secured thereto by the screws, *t*, is the plate, L, and beneath this plate the secondary or auxiliary trough, M, the bottom of which is substantially similar to that of the superior trough, I. *u*, are openings through the inner wall of the lower trough, the object of which will be presently explained; *w*, are screws which secure the two troughs together, and by means of the screws, *x*, which pass through the bottom plate of the lower trough, M, the latter is secured firmly to a hub, *y*, and circular plate, w^2, attached to the vertical shaft, B; this shaft terminates in the spout or hollow conveyor, P, which is guided and steadied by the bearing, Q. *z* and *v*, are openings through the bottom of the washing troughs, which are closed by screw plugs or otherwise, and are for the purpose of withdrawing the metal from the machine when the operation has proceeded sufficiently far. A rapid vibratory motion is communicated to the troughs, I and M, in the following manner:—From the shaft, F, motion is communicated to the shaft, A^1, by the band, R^1. C^1, D^1, are cranks upon the shaft, A^1, fig. 3, which vibrate the pitmans, E^1, F^1. From the rectilinear reciprocating motion thus produced, a vibrating motion of the troughs, I and M, is produced in the following manner: —a^{11}, figs. 2, 3, and 6, is a screw cut upon the end of the pitmans, E^1, F^1, over which, for the purpose of protecting its threads from injury, passes the tube or sleeve, b^{11}; c^{11}, are jam nuts, seen in fig. 2; next this comes the washer, d^{11}; against this washer bears the spiral spring, f^{11}, the other end of which rests upon another washer, also strung upon the tube, b^{11}; this washer has a concave bearing, e^{11}, which receives one of the convex washers, g^{11}; the other rests against a similar concave bearing in the washer, h^{11},

between which and the washer, k^{11}, is the spring, i^{11}, the whole being held in place by the nut, l^{11}. Projecting from the bottom plate of the trough, M, are the ears, m^{11}, fig. 5, through the holes, n^{11}, in which the tube, b^{11}, and screw, a^{11}, are passed; the other parts are then arranged in the order represented in fig. 3, the ears, m^{11}, being confined between the convex washers, g^{11}, and thus as the shaft, A^1, revolves the washers, g^{11}, are allowed to move on their concave bearings, and the troughs are vibrated without torsion or strain upon the parts, the springs, f^{11}, i^{11}, serving to give ease to the motion of the parts.

Operation.

The pulverized ore and water are conducted in any suitable manner and in proper quantities to the basin, C, thence they pass through the holes, *b*, to the distributor basin, D, and through the tubes, E, they are evenly and uniformly distributed around the periphery of the first or upper trough. The water is admitted in quantity much greater than can pass through the holes, *s*, and continually flows over the inner edge, *q*, of the trough. It is at this point that the distinguishing feature of my invention manifests itself; this portion of the operation will therefore be minutely described. The pulverized ore rises sufficiently high to pass over the ledge, *k*, when it is immediately washed through the holes, *s*, by the stream constantly passing them; as the trough vibrates, the bottom plate partly slips beneath the particles of sand, and partly communicates its motion to them, at the same time the water which remains comparatively motionless above the sand retards its uppermost particles and rolls them over, and the latter are thus constantly loosened up and kept in motion with respect to each other; the metallic particles are thus allowed to descend to the bottom of the trough where they accumulate, as seen at c^1, fig. 2; above this the lighter particles collect, as at f^1, and pass continually over the ledge, *k*, and through the holes, *s*, as before described. So soon as this accumulation commences, the metallic particles pack together in the bottom of the trough, and then move with it in its vibrations; the lighter particles still being agitated and kept suspended in the water above the surface of the compacted metallic particles, it is evident that the troughs should be vibrated with just that force which shall permit

the metallic grains to settle and compact, as above explained, and at the same time shall keep the lighter particles of the ore suspended in the water. If the force be materially increased, then the metallic particles will not settle and compact, but will be themselves agitated, and consequently will flow over with the waste ore, and a loss will be the result. If the force with which the trough be vibrated be materially less than that necessary to produce the most desirable result, then, although the metallic particles may all be saved, yet they will be mixed with a greater proportion of waste ore, and the effective operation of the machine will be clogged. Should any metallic particles pass off with the waste sand, the latter is again subjected to a second washing in the following manner:—Having passed through the holes, *s*, it is received by the plate, L, and immediately carried by the water, which passes over at *q*, to the point, i^1, and into the lower trough, M, this trough being vibrated with the ore above it. The pulverized ore is submitted to a similar operation to that to which it was subjected in the upper trough, being rubbed and partially set in motion by the bottom plate of the trough, while this motion is at the same time retarded by the water, which remains stationary, or very nearly so, and the particles are rolled over and kept in constant motion with respect to each other, as before, at the level of the ledge, m^1, over which they are permitted to pass; any metallic particles which may have escaped from the first trough settle immediately at the bottom of the second, and collect at y^1. The waste ore passes off as before over this ledge, m^1, through the holes, *u*, and is washed by the water which passes through these same holes, and over the inner edge, s^1, of this trough down through the holes, l^1, u^1, into and off through the hollow shaft, P; this operation is continued until the copper or other metal has collected in the upper basin to near the ledge, *k*, or to as great a height as it is found expedient to permit it to accumulate. The flow of the material into the basin, C, as well as the motion of the machine itself, is then stopped, the holes, *z* and *v*, are opened, and the machine is tilted slightly forward to facilitate the discharge of the metal, a stream of clear water being turned into the basin, C, to assist in loosening up the deposit and washing it out, and the machine being set in motion for the purpose of facilitating the operation.

With some ores, and under certain circumstances, I employ a modification of the above-described machine, represented in figs. 7 and 8, of the accompanying drawings. In this machine a single trough is employed, and the parts are so arranged that the introduction of the ore and water shall in nowise interrupt or disturb either the deposition of the metallic particles or the passage of the water and waste ore from the trough. The trough is vibrated, as in the machine described above; the pulverized ore and water are permitted to flow into the basin, B^3, and pass by the conductors, C^3, on to the circular plate, D^3, whence they fall uniformly and gently into the water at the point, a^3. A uniform flow of water is produced from the circumference of the trough to the centre, as follows:—Clean water is delivered to the exterior basin, E^3, from which it passes by the conductors, F^3, to an annular chamber, G^3, entirely surrounding the trough; from this chamber it passes through the holes, f^3, to the trough, and thus a uniform current of water is produced from the circumference to the centre, which carries with it the soil and lighter particles of ore, without interrupting the deposition of the metallic portions which accumulate at the bottom of the trough. The line, x^3, represents the level to which the water within the trough is maintained; the line, y^3, the level at which the waste ore passes over the ledge, k^3.

Having now set forth the nature of this invention, and explained the manner of carrying the same into effect, I wish it to be understood that under the above recited letters patent I claim,—

First, the within-described method of washing pulverized ores, the ore and water being agitated together in a vessel or trough, to the bottom of which the heavier or metallic particles are caused to settle, while the lighter particles of the ore pass off with a portion of the water at a high level, and the balance of the water overflows at a still higher point, in the manner herein set forth.

Secondly, I claim the trough, I, when constructed with the ledge, *k*, as described, and operated in connexion with a head of water kept above the level of the said ledge, in the manner set forth.—In witness, &c.

WILLIAM BALL.

Specification of the Patent granted to WILLIAM PORTER MADDISON, *of Barnsley, in the County of York, for An Improved Telegraph or Apparatus for the Transmission of Signals.*—Dated April 5, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in transmitting signals from one place or station to another, by exerting mechanical pressure upon atmospheric air in a tube, one end whereof is fitted with a small cylinder and piston, as also a piston rod, to the top of which a small weight or hammer is affixed, said cylinder being held in proper position by screwing the same to a piece of wood. There is a bell or other mechanical contrivance fixed to the said piece of wood immediately over the aforesaid hammer, which is caused to strike the said bell by compressing the atmospheric air contained in the tube, for which purpose the opposite end of the tube is connected to a pair of bellows, the upward movement whereof allows the atmospheric air to enter the bellows, and the downward movement of said bellows compresses the air in the tube, and thus effects the raising of the hammer and the striking of the bell, and in this manner signals may be transmitted from place to place in a simple and efficient manner.

In order to explain my said invention as completely as possible, I now proceed to describe best the means I am acquainted with for carrying the same into practical effect, reference being had to the illustrative drawing hereunto annexed, and to the numeral figures and letters of reference marked thereon respectively, as follows:—

Description of the Drawing.

Fig. 1, is an elevation of one form of construction of my improved telegraph or apparatus for the transmission of signals;

Fig. 2, is a sectional elevation of another form of construction of my said improved telegraph. At fig. 1, A, is a tube, elastic or otherwise; B, a cylinder, fixed to the top thereof and to a piece of wood, Z; this cylinder is fitted with a piston, C, which should not work air-tight therein; D, a rod, affixed to said piston; E, a small weight or

hammer, fixed to the top of the said rod; G, is a bell, fixed to the piece of wood, Z, immediately over the hammer, E; H, is an ordinary pair of bellows, the size whereof must be in accordance with the length and diameter of the tube, A; the nose of these bellows is connected air-tight to the tube, A. The mode of operating with the above improved telegraph or apparatus is as follows: — Supposing the piston and bellows to be in the position exhibited by the drawing, it will appear evident, that upon exerting pressure upon the top of the bellows the air contained therein will be compressed, and passing up the tube, A, will be forcibly pressed against the piston, thereby causing the hammer to strike the bell, any surplus air, together with the air above the piston, passing freely out through the holes, *a*, *a*.

As regards the construction of the apparatus exhibited at A, fig. 2, it consists in substituting cylinders, A, fitted with pistons, B, and valves, *b*, *b*, in lieu of the bellows, H, at fig. 1, and further in exhausting the air from the tube, A*, instead of compressing it therein, as previously described. By these means the external atmospheric pressure forces the piston, B^1, up the tube, A*, and imparts motion to the index hand, *c*, the point whereof may be used in connexion with a dial plate, having divisions and numeral figures marked thereon, or other symbols representing certain conventional signals, which can be easily read off. By arranging the valves, *b*, *b*, in the manner exhibited at B, fig. 2, the apparatus then operates so as to compress the air in the tube, A*, in a similar manner to that previously described with reference to fig. 1.

I would here remark, that by modifying the construction of the lastly above-mentioned apparatus, that is to say, by placing two pistons in one tube instead of two separate tubes, and by exhausting the air from one piston and compressing the air against the other piston, each piston being attached to a pointer or indicator, a telegraph thus constructed may be made to send and receive messages at the same station, or, in other words, to convey signals in two directions in one tube, so as to send and receive a signal at the same station. I also propose by the above arrangement to transmit signals to a number of stations communicating with several other stations by means of one or more tubes.

Having now described the nature and object of my said invention of "An Improved Telegraph or Apparatus for

the Transmission of Signals," together with the best means I am acquainted with for carrying the same into practical effect, I would remark, in conclusion, that what I claim as my invention, intended to be secured to me by the above in part recited letters patent, is,—

The mode above set forth of transmitting and receiving signals by the use of apparatus constructed and actuated as above particularly described, and represented by the drawing hereunto annexed.—In witness, &c.

WILLIAM PORTER MADDISON.

Specification of the Patent granted to JOHN DE COCKKENIFECK, *of Cork, in the Kingdom of Ireland, Belgian Inspector of the Royal Flax Improvement Society of Ireland, for An Improved Process and Apparatus for Preparing, Refining, and Filtering Oils or Fatty Matters.*—Dated May 24, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention of an improved process and apparatus for preparing, refining, and filtering oils or fatty matters relates,—

First, to a novel or improved method of operating upon or preparing oils by means of chemical agents, which will remove any disagreeable smell from the oils or fatty matters;

And by means of suitable apparatus, which constitutes the second part of my said invention, the oils, after being acted upon chemically by the process hereafter described, are refined and filtered, so as to remove any impurities that may be mechanically mixed therewith.

In carrying out my invention, the oils are first mixed with acids, which will act upon the fatty matters and alter the liquidity thereof; then these acids are neutralized by the addition of some alkaline matters, according to the nature of the acid that has been used.

After the oils or fatty matters have been acted upon by the acids and alkalies for a sufficient length of time, they are to be poured through a filter containing any convenient mealy substance, which is to be placed in a filtering appa-

ratus, which forms the second part of the invention. In this apparatus the mealy substances are placed upon a perforated or porous bed, and the oils or fatty matters to be purified having been poured in, are, by means of pressure, forced through some pulverized alkaline earth and through the layer of mealy substances. By this means the oils or fatty matters are not only purified from any mechanical impurities that they contain, but the alkaline earths and mealy substances act upon and remove or retain any particle of acid or alkali that may remain unneutralized, and the oils or fatty matters will run out perfectly purified and refined.

Having thus briefly explained my improved process and apparatus, I will now proceed to describe the same more minutely, so that any intelligent manufacturer may be enabled to put the process into operation.

The oils and fatty matters are first operated upon by sulphuric acid, of which from one to three per cent. must be added thereto, according to the quality and state of the oils and fatty matters. The acid must be properly and intimately mixed with the oils or fatty matters in a suitable vessel, as described hereafter, after which the acid must be washed out as far as possible by water, to which may be added an alkali, such as lime; the oils or fatty matters are then to be run into a cylinder provided with a piston, so arranged as to create mechanical pressure on the oils or fatty matters, without the employment of any extraneous motive power, such as steam or water power. The oil or fatty matters are by this means forced into a filter made of cast iron, and containing an alkali, such as calcined marble or magnesia, through which the oils and fatty matters first pass, and where the last vestige of acid is absorbed by the alkali. The oils or fatty matters are forced in the same vessel through a layer or mass of mealy substances obtained from oily seeds, and which mealy substances act chemically upon the alkali, so as to absorb it, thereby freeing the oils and fatty matters from all impurities. The basis of the above-described process of purifying and filtering is, that the alkalies are made to react upon and neutralize the acid, and the mealy substances will extract or remove the alkali, together with all the impurities and acids.

I would observe that the different kinds of mealy sub-

stances which may be obtained from oily seeds may be employed to impart their smell or odour to other varieties of oils passed through them. The whole operation of refining, purifying, and filtering will be completed in twenty-four hours without the application of any artificial heat.

In the accompanying drawings I have shown the arrangement of apparatus which I propose to employ in carrying out the processes just described.

Fig. 1, is a general elevation of the whole apparatus, some of the parts being shown in section, in order that their construction may be more clearly seen and understood. 1, is a glass vessel containing sulphuric acid, and is provided with cocks or taps at each side for discharging the sulphuric acid into the stirring vessels or vats, A^1 and A^2, which are of precisely the same construction, and are divided into two compartments, A and B, and A* and B*. The parts A and A* are the compartments where the oils and fatty matters are mixed with the acid, by means of the stirring or agitating apparatus, D, fixed therein, and which stirring or agitating apparatus are driven by pulleys and belts, *a*, *a**, and *b*, *b**. When the oils or fatty matters have been operated upon by the sulphuric acid, and the stirring operation (which lasts for one hour) is completed, water mixed with alkali is run into the compartments, B, B*, and by rotating or turning the double bottom, C, of the compartment or chamber, B, the alkaline water will be equally discharged through the perforated bottom underneath, and will fall into the fatty matters in the compartment, A.

From ten to twenty hours after the above operation, the oils and fatty matters are discharged through the pipes, *e*, into the cylinder, E, or direct into the filtering apparatus, F. Where ten feet clear of natural pressure can be obtained, the filter well work moderately well, and the pressure created by the cylinder, E, may be dispensed with; in which case, the second stirring vat, A*, is turned into a standing reservoir. *f*, *f*, are openings for obtaining access to the vessels, A, A*, for cleansing the same when required, and are closed by suitable doors; *g*, *g*, are cocks for letting off the water from the stirring vats after cleansing the same; E, is a cast-iron cylinder, mounted or supported in a wooden frame, in which a piston works to create pressure;

h, is a platform attached to the upper end of the piston rod, and on which weights, *j*, are placed, as shown in the drawing, according as they may be wanted; *k*, is a chain passing over rollers, attached to the platform, *h*, and provided with a hook at the opposite extremity, whereby it is attached to another platform, *l*, also containing weights, *m*. In order to put this part of the apparatus in operation, the cock of the pipes, *e*, communicating with the vats, A, A*, containing the oils or fatty matters, is opened, and the pressure of liquid on the vats (which are above the level of the cylinder, E), aided by the weights, *j*, *j*, hanging at the other extremity of the chain, *k*, will force up the piston of the cylinder, E, and fill the same with the oils or fatty matters. When the piston arrives at its proper elevation, the platform, *l*, containing the counter weights, *m*, at the end of the chain, *k*, will, by touching the ground, become unhooked or detached from the chain, *k*, and the piston of the cylinder, E, thereby left free to press on the mass contained in the cylinder. When the entrance valve of the supply pipes at the bottom of the cylinder is shut, and the pressure of the piston is thrown on to the oils or fatty matters in the cylinder, the pressure will force them down the pipe, *n*, communicating with the filter, F.

By placing the platform containing the counter weights, *m*, on the tumbling board, *o*, the cylinder will repeat a second operation of filtering without any assistance, for when the piston in the cylinder, E, descends, the rod, *p*, touches the hook, *q*, thereby freeing the board, *o*, and setting the counter weights, *m*, free to descend and draw up the piston in the cylinder, E, so that by simply moving the counter weights, *m*, from the ground to the board, *o*, the cylinder, E, will fill itself twice without asistance, which will be found a great convenience for night work.

Fig. 2, represents the filter, F, in elevation and in its working position as regards the other parts of the apparatus.

Fig. 3, is a plan view of the same.

Fig. 4, represents a sectional view of the filter, drawn upon an enlarged scale. *r*, is a compartment or vessel containing the alkali; *s*, is the compartment containing the mealy substances.

The oil is introduced either from the cylinder, E, or direct from the reservoir vat, A*, by the cock, *t*, and after

passing up through the mealy substances, is discharged pure around and on the surface of the filter through the holes, *u*, and received in the rim or channel, *v*, from whence it is drawn off by the cock, *w*.

Having now described my invention of an improved process and apparatus for preparing, refining, and filtering oils or fatty matters, and explained the means of carrying the same into effect, I would observe that I am aware that oils and fatty matters have been heretofore treated with sulphuric and other acids, and also with alkalies, for the purpose of purifying and refining the same; I do not, therefore, mean or intend to claim the exclusive use of mineral acids and alkalies for such purposes, except when the same are used in the manner above set forth, nor do I intend to confine myself rigidly to the precise arrangement or construction of parts herein shown and described, as they may doubtless be varied in some particulars without departing from the nature and object of my invention. In conclusion, I claim as the invention secured to me by letters patent as aforesaid,—

First, the use of an alkali in the filtering operation for the purpose of neutralizing any acid that may remain in the oils or fatty matters after they have been operated upon by the previous process.

Second, I claim the use of mealy substances obtained from oily seeds, as the filtering ingredient or substance to be placed in the filter for separating the impurities from the oils or fatty matters.

Third, I claim the apparatus herein shown and described for exerting pressure on the oils or fatty substances, for the purpose of forcing the same through the mass of material contained in the filter; I claim particularly the use of the cylinder, E, with its weighted piston and piston rod; and,

Lastly, I claim the mode herein shown and described of constructing the filtering apparatus.—In witness, &c.

JOHN DE COCKKENIFECK.

Specification of the Patent granted to THOMAS WILLIAM WILLETT, *of* 89, *Chancery-lane, in the County of Middlesex, Civil Engineer, for Improvements in the Manufacture of Gunpowder.*—Dated June 3, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—At present when it is desired to moisten the charge in an incorporating gunpowder mill it is done by the addition of hot or cold water applied to the charge, either by hand, with a small watering pot, or by suitable apparatus attached to the mill, for supplying a stream of water, the amount and the temperature of which can be regulated at pleasure.

Now, my first improvement consists in the direct application of a jet or jets of steam to the charge of powder while in the mill, by which means the charge is more regularly and evenly moistened than by the application of water. These jets of steam are caused to issue either from pipes attached to certain stationary parts of the mill, or (which I prefer) from pipes revolving with the runners or rollers.

My second improvement consists in the application of an artificial current of air to the interior of an incorporating gunpowder mill, for the purpose of drying the charge at the proper stage in the manufacture. The current of air I prefer to conduct by stationary pipes to the interior of the mill, but it may be caused to issue from pipes revolving with the runners or rollers; but in either case I prefer so to arrange the current that it does not forcibly impinge upon the surface of the charge, but only pass gently over it.

Having thus stated the nature of my invention, I will proceed to describe more fully the manner of performing the same, reference being had to the drawing hereunto annexed.

Fig. 1, represents a portion of an incorporating gunpowder mill. The mill bed, B, with its surrounding woodwork, R, and the masonry, C, (upon which the mill is erected,) are shown in section. I may here observe, that for the purposes of my invention I prefer that construction of a mill in which the stone shaft is driven from beneath

the mill bed, but my invention may be readily adapted to other mills.

A, is the runner; F, the runner shaft, a portion of which with one of the runners is removed; S, S, is the steam pipe, attached to the beam, U, by the clips, T, T. The steam pipe, S, passes into the stuffing box, K, of the small steam chest, G, which is attached to the head, E, of the driving shaft, D, and which, therefore, revolves with the runners. From this steam chest, G, pass two steam pipes, H, H, which terminate on two other small steam chests, K^1, K^1. These steam chests I prefer to make in length about four inches less than the width of the mill bed, and in width from seven to eight inches, according to the size of the mill. The bottom of these steam chests, K^1, K^1, is perforated with small jets or pipes, L, L, the arrangement of which will be better seen by reference to fig. 2, in which W, is the bottom of the steam chest, K^1, (by preference of strong sheet copper,) and V, V, V, the small steam pipes. These are made to rise about three quarters of an inch into the interior of the steam chest, the object of which is to allow the water of condensation to collect in the bottom of the chest instead of falling upon the charge. I, I, are two stop cocks, by which the amount of steam supplied can be regulated at pleasure. M, is a hollow pipe, resting upon the central block, N, and connected with the pipes, P, P. Air from a fanner or other suitable apparatus is conducted by these pipes, P, P, to the hollow pipe, M, whence it issues through the small apertures, *m*, *m*, *m*. These apertures should be placed as near the bottom of the hollow pipe, M, as possible, so that the current of air issuing from them may be deflected by the central block, N, and compelled to pass above the surface of the charge, so as to ventilate and dry the same, and yet not to cause it to rise as dust. This current of air (which may be heated with advantage in damp weather) must be regulated at the discretion of the mill man, according to the state of the charge; but in all cases the current must be very gentle, and such as not to raise the charge in dust. In those cases where it is required to hasten the drying of a charge to an extent that would by the above-described arrangement cause the dust to rise, I prefer to reverse the direction of the current, and by exhausting the air from the hollow pipe, M, by means of a fanner or other suitable apparatus in connexion with the pipes, P, P, I create a

current of air over the surface of the charge, but the dust that is then raised is for the most part carried towards the openings, *m*, *m*, *m*, which should be covered with a thin woollen cloth to prevent the ingress of the powder.

In constructing a mill in which this reversed current alone is to be used for the purpose of drying the charge, I make the hollow pipe, M, of greater size, and the apertures, *m*, *m*, more numerous, and in such case I do not employ any woollen cloth over them, but allow the powder dust to enter freely and pass along the pipe, P^1, which is then made to terminate in a water chamber, constructed on the plan of a Turkish water pipe, and the whole, therefore, of the dust that is carried with the current along the pipe, P^1, is thus detained in the water. It will be obvious that this ventilating, M, might be arranged on the outer instead of the inner margin of the mill bed, or that the current of air (forward or reversed, as before described,) might be applied by an apparatus similar to that I employ for the application of the jets of steam, and similarly the steam might be applied by the apparatus I have here described as suited for the application of the current of air; but I prefer the arrangements I have shown, for in all cases I think it desirable that the steam issuing from the steam jets should directly and more or less forcibly impinge upon the charge; and, on the other hand, I think that the air current should not impinge upon it, but only pass gently over its surface.—In witness, &c.

THOMAS WILLIAM WILLETT.

Specification of the Patent granted to ROBERT FOULDS, *Overlooker, and* WILLIAM BRACEWELL, *Manufacturer, both of Barnoldswick, near Colne, in the County of Lancaster, for Certain Improvements in Power Looms Constructed on what is called the "Loose Reed" Principle.*—Dated May 15, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Our invention applies solely to looms constructed on what is called the "loose reed" principle.

First, a small finger is applied to the backboard of the

slay, for the purpose of keeping the loose part on the backboard firm until the shuttle passes by it, when the shuttle misses "boxing," and is caught in the edge or selvage of the warp. This finger liberates the loose backboard, which has hitherto always been held by the ordinary plate spring, which improvement will prevent the shuttle from being thrown out of its course whilst passing to the other box.

Secondly, we provide a guide or conductor for the shuttle betwixt the end of the reed and the backboard, which guide falls back when the reed flies out; and when the reed is replaced, the finger above-named and the shuttle conductor readjust themselves, and thereby prevent the breaking of the twist or warp.

Thirdly, this invention allows of the shuttle being loose in the box at the time of "picking;" this is accomplished by a lever connected between the "crank arm" of the loom and the "swell" in the shuttle box, which stays the shuttle by means of the swell at the time of entering the box, and also liberates the shuttle at the time of "picking;" or this part of our invention may be worked by any other suitable means equivalent to the above-named lever, in order to effect this object in looms constructed with a "loose reed."

In order that this invention may be better understood and explained in detail, we have hereunto attached a sheet of drawings,—

Fig. 1, being made upon a scale of about one inch and a-half to the foot; and

Figs. 2 and 3, about one quarter the real size, and having similar letters of reference marked upon corresponding parts of the apparatus throughout all the figures.

Fig. 1, is a front elevation, of a power loom to which the "loose reed" principle is applied, and shows principally the yielding backboard and "swell" in the shuttle box, and also the position of the guide or conductor designed for the purpose of securing the true throw of the shuttle.

Fig. 2, is a detail view of one shuttle box and its adjacent apparatus, which illustrates more fully the novel method of actuating the guide by means of the "loose reed" motion, and also the connexion of the same with the backboard by means of the finger applied thereto.

Fig. 3, is a plan view of the shuttle box, as shown in fig. 2, exhibiting more particularly the lever and rod in con-

nexion with the "crank arm" and "swell" for retaining and liberating the shuttle in its box at the requisite times.

In fig. 2, *a*, *a*, is the shuttle box, at the back of which is situated the backboard, *b*, which is attached to the guide, *c*, by means of the finger, *d*, each of which parts receive motion from the pressure of the shuttle, and are re-adjusted by means of the "loose reed motion," *e*; the swell, *f*, is actuated by apparatus placed behind the backboard, and in connexion with the crank arm, as will be seen in fig. 3, in which the finger, *g*, moves the lifts, the spring, *h*, constantly pressing upon the swell, *f*, by the action of the lever, *i*, which receives motion from the crank shaft, *k*, being connected thereto by the "bush" or "bearing," *l*.

The action of the various parts, and of the combination of such parts, will be more easily understood upon reference to the drawing, and the following explanation descriptive of the operation of the same. When the shuttle is struck through the "race," it presses against the "reed," and the back plate retaining such "reed," being a connexion with the spring and "loose reed motion," allows the reed to give way for the shuttle to pass at the same instant the guide, *c*, and backboard, *b*, are depressed, and the swell, *f*, also is removed by the finger, *d*. The shuttle may now enter the box free from any pressure which might cause it to deviate from its true course, and thus complete its "race," but immediately the shuttle passes the reed guide and loose backboard they are readjusted by the "loose reed motion," and the finger, *d*, releases the spring, *h*, and thus allows the "swell," *f*, to retain the shuttle firmly in the box until the "picking motion" again comes into action for the succeeding "throw," upon which the "swell" is again removed, and the loose backboard guide and reed give way for its clear passage, as before, until it "boxes" at the opposite end of the loom, and so on at every "pick" of the shuttle throughout any length of weaving.

Having now described the nature and object of our said invention, together with our method of carrying the same into practical effect, we wish it to be distinctly understood that we claim,—

First, the application and use of the guide or conductor, *c*, in connexion with and actuated by the same mechanism as the "loose reed," used to ensure the more true course of the shuttle.

Secondly, the employment of a "loose backboard," worked by the same mechanism, and for the above-named purpose; and

Lastly, we claim the novel method of releasing and retaining the shuttle by means of the lever and finger in connexion with the crank arm and spring pressing upon the swell, together with the general arrangement of machinery or apparatus for effecting the above-named purposes, and as have been hereinbefore described and set forth, and fully exhibited in the accompanying drawings.—In witness, &c.

ROBERT FOULDS.
WILLIAM BRACEWELL.

Specification of the Patent granted to RICHARD ARCHIBALD BROOMAN, *of* 166, *Fleet-street, in the City of London, for Improvements in Plating Glass to Render it Reflective.*—Dated June 4, 1856.—(A communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention is stated by the inventor to consist in plating glass by depositing upon it certain metallic and other substances, as hereinafter named, decomposed by the action of acid or acids, as in the galvanic battery, and in a gaseous or vapoury form, and in reducing and fixing such metallic and other plating agents in such gaseous form by the agency of electricity or galvanism, or both, upon the glass, into a metallic or solid state, whereby glass will be rendered reflective.

The invention also consists in certain arrangements of machinery for carrying it into effect.

All or nearly all metals and metallic salts will be capable of being decomposed and of being deposited upon glass, when they are made to form an element in or make part of a galvanic battery; but it will at once be obvious that the lighter the colour of the metal, the greater will be its fitness for rendering glass reflective.

As it will be at once apparent, after the nature of this invention has been set forth, that there will be numerous different methods of carrying it into effect, and as the

agents employed may be varied by one being substituted for another, and by different proportions being used with more or less beneficial effect, it is not proposed to set forth herein every form or mixture of plating agents which may be employed; but first will be pointed out such as the inventor deems most suited for the purpose of this invention, and then one set of ingredients will be described, together with the machinery, which the inventor states he has found well suited to carry it into practical effect.

The following are among the substances used:—Black oxide or oxide of iron, ethiop's martial, salts of tin, tin in grains, protoxide of tin, salts of zinc, sulphate of zinc, hydrosulphate of ammonia, acetate of lead, acetate of alumina, iodine, meta-gallic salts, chloride of gold, carbonate of potassa, salts of soda, manganese, salt of alum, bromines, sulphuric, hydrochloric, and benzoic acids, ether crystallized hemantine (l'hémantine crystallisée), sulphate of copper, muriatic acid, and acids generally.

The manner of operation is as follows:—The inventor takes a plate of glass and perfectly cleans the surface upon which the gas is to be applied, and then places the clean surface upon a plate pierced with numerous small holes, which plate is the top of a flat chamber which forms part of the machine, of which fig. 1, is a side, and fig. 2, an end elevation.

A, A, is the framework, the upper surface of which is planed true, and formed with a flange, *a*, *a*; B, is a roller, the axis of which revolves in fixed bearings, and has keyed to it the toothed wheels, C, D, one at each end; E, is a cylinder, to one end of which the toothed wheel, F, is attached, the axis of this cylinder revolves on journals, which are free to rise and fall in slots formed in each of the standards, G, G, as will be seen by the drawings; the axes of the roller and cylinder are not in the same vertical line, that of the roller being slightly in advance of that of the cylinder. Forked rods, H, H, on each side of the machine, are attached to the journals, and are connected at bottom to two levers, J, J, and the parallelism and equal rising and falling of the axis of the cylinder, E, at both ends is secured by strong transverse coupling bars both at the side and front of the machine; *b*, is a counterpoise, to facilitate the lifting of the cylinder; K, is a roller, the axis of which is free to rise and fall in slots in the upper part of the standards, G, G; connecting rods at each side of the

machine communicate with the journals or axis of the cylinder, E, and the distance between the roller, K, and this cylinder being once regulated, they each rise or fall through an equal space, and consequently preserve their relative positions; L, is an endless band of soft, yielding, or compressible material passing round the cylinder, E, and roller, K; M, is the hollow chamber with the perforated top, before named; *c*, *c*, are friction wheels connected to the ends of the chamber at bottom, and which travel upon the smooth surface of the upper part of the frame; N, is a pinion for driving the roller, B, through the toothed wheel, C, while the toothed wheel, D, causes the cylinder, E, to revolve with the roller, B, through the toothed wheel, F. Care must be taken that the cylinder, E, roller, B, and top and bottom of the hollow chamber are true, and the distance between the cylinder and roller having been regulated to allow of the chamber with a sheet of glass passing over one and under the other, the operation of coating the under surface of the glass with the gaseous fumes has to be performed. At one end of the hollow chamber is a hollow ferrule or portion of a tube screw-threaded, or there may be two or more such ferrules; and to as many as there are is attached, by screw couplings or joints, a flexible (preferring caoutchouc or gutta percha) tube; each tube has a stop-cock, and is connected to a gas receiver in the form of a cover placed over the trough, vessel, or vessels in which the action of decomposing the metals and substances hereafter named is being carried on, in such manner as to collect all the products given off. The troughs or vessels must be of gutta percha, earthenware, or of some other material not acted upon by acids. Each trough or vessel contains sodium, cadmium, zinc, ethiop's martial, sulphuric, nitric, muriatic, and meta-gallic and boric acids, in sufficient quantities and strength to excite the metals to action.

As soon as the metals and substances begin to be decomposed and to pass off in a gaseous form, the stop-cocks are opened, when the gaseous fumes having no other outlet, fill the hollow chamber, and passing through the apertures in the perforated top, pass on to the glass. As soon as the stop-cocks are opened, the hollow chamber and glass are advanced, until the bottom thereof comes in contact with the roller, B, which being caused to rotate, drives forward the chamber and glass, which latter receives a slight pres-

sure through the soft endless belt, and effectually secures the gaseous coating through all the perforations in the top of the chamber on to the glass; and in order to distribute the gaseous fumes evenly and smoothly, a roller is fitted at one end of the hollow chamber, over which the glass is pushed on its passage on to the machine, where the electric currents are applied to fix and recompose the metals and other substances on the glass, as follows:—

Fig. 3, is a side elevation in perspective, and

Fig. 4, an end view, of the machine for applying the electric currents and for fixing the substances upon the glass. Upon standards, A, A, there is a skeleton platform or frame, B, B, the whole of which is insulated by the insertion in the standards of glass or other non-conducting material. A hollow chamber, with the upper surface perfectly smooth and solid, is mounted upon friction wheels, formed of ivory, glass, or other non-conducting substance, which travel upon the sides of the frame or skeleton platform. The inventor prefers the upper surface of the hollow chamber to be of bronze. For greater convenience, rollers of wood, or rollers clothed with a non-conducting substance, may be mounted under the hollow chamber, in order to cause it to advance by frictional contact. The chamber may, however, be pushed to-and-fro otherwise; and for the placing of the glass thereon I mount a roller clothed with a soft material at the end where the glass is to be received on to it. C, C, are side frames, which act as guides to the chamber, and which serve to support a cloth for covering over the chamber and the glass while the fixing is being performed; D, is a chamber open at top, and with the edges coming close to the bottom of the hollow chamber, for containing a spirit or other lamp, or gas burner; E, is a pillar containing a galvanic battery, from which the wires are conducted and connected to some convenient part of the hollow chamber; F, is a glass disc for generating frictional electricity; G, G, G, are a series of strong oval vessels formed in metal and lined with an acid-resisting material; these vessels are screwed into one another, and the lowest vessel is furnished with a brush or skin, which being rubbed against by the glass, electricity is generated and received by the lowest vessel; each of the four lowest vessels contains a mixture of boric and sulphuric acid, and the electricity aids in developing a highly

heating gas, which passing through the other vessels shown in the drawing, finally enters the hollow chamber through a metal pipe, provided with suitable joints and elbows to suit the changing position of the hollow chamber. All being in readiness, the plate of glass, with the metallic fumes thereon, is passed from the fume-depositing machine on to the solid top of the hollow chamber; in the fixing machine the wires are connected with the battery, communication is opened for the in-flow of the heating gases, the lamp in the case is ignited, and the cloth is lowered over the end frames; as soon as the current is applied the substances will be recomposed and fixed on the glass, and the glass will be thereby rendered reflective, although the inventor states he finds heat aids the electric current, yet it is not absolutely necessary, and the current itself may be applied alone. In such case, a solid flat plate might be substituted for the hollow chamber. The reflecting composition will be found to adhere to the glass perfectly well, and will not be easily rubbed off; but, if thought desirable, a protective coating, composed of some of the following substances, may be applied:—Tar, galipot, plaster, lime, cement, whiting mixed with glue, chalk, ochre, oil colours made up with drying oils.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the plating of glass in order to render it reflective, by applying thereon metallic and other fumes obtained by the decomposition of metals and other substances, as hereinbefore described, and the recomposing and fixing of such metals and substances from the fumes upon the glass by the agency of electricity.

Second, the machinery hereinbefore described and represented in the drawings annexed for the plating of glass.—In witness, &c.

RICHARD ARCHIBALD BROOMAN.

Specification of the Patent granted to MACLEROY NEILSON, *of Thorn Mill, in the County of Renfrew, North Britain, Cotton Spinner, for Improvements in the Treatment, Preparation, or Finishing of Yarns or Threads.*—Dated May 21, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention relates to the treatment, preparation, or manufacture of the finer classes of cotton and other yarns, for the purpose of giving such yarns a superior finish and other properties, rendering the same of a higher commercial value than ordinary untreated yarns of a similar kind. The yarn to be prepared in this way may be taken in various stages and from various spinning machines. If mule cotton yarn is to be operated upon, the cops when removed from the spindles are first of all steamed or boiled, and they are then boiled in starch. After this treatment the cops are wound on to bobbins, and are then put into a doubling frame or other suitable twisting machine. As the yarn passes off from the bobbins in this operation it is directed through a chest of starch or dressing material on its way to the flyer, which is arranged simply to twist the yarn, and then wind it upon bobbins, just as in a common throstle. The doubling frame, or whatever machine is employed for operating upon the yarn in this way, is arranged for the purpose of adding a high degree of twist to the yarn without affecting it in any other way. After this routine the prepared yarn is reeled, warped, or applied in subsequent manufacturing processes, just as may be required by the practical manufacturer. Yarn thus treated possesses a peculiar degree of fine finish, rendering it most particularly well suited for the manufacture of fine muslin and other goods, more especially such muslins as are to be embroidered, or manufactured into "sewed muslins."

And in order that my said invention may be properly understood, I shall now proceed to describe an explanatory drawing on a sheet hereunto attached, such drawing being a transverse vertical section of a spinning frame as arranged for practically carrying out my invention.

The yarn when in the cop form, for example, is first steamed or boiled in water, and is then boiled in starch or

any other suitable dressing material. The cops are then transferred to a frame, such as that represented in the drawing, and being placed in a row upon skewer holders, as at A, the yarn, B, is drawn off them and passed over a guide rail, C, whence it descends into the box, D. This box is supplied with starch or other suitable dressing material, and is heated by means of steam, which is conveyed into it by the pipe, E. The yarn, B, passes beneath this pipe, E, and being well saturated with the dressing material, leaves the box, D, and proceeds onwards between glass pillars, F, round one of which each thread may be turned, if necessary, to the rollers, G. Each thread is passed between these rollers, G, and once round the upper one, if necessary, to prevent its being drawn too rapidly off the cop. From these rollers, G, the yarn, B, passes through the guide eye, H, to the spindle and flyer at I. The yarn is wound upon the bobbin, J, by the ordinary spindle-and-flyer action. It is at this stage that a high degree of twist is given to the yarn, the starchy treatment removing the tendency to untwist, which the yarn would otherwise have. The starchy treatment also causes the loose fibres to be well incorporated with the body of the yarn, so that the finished material presents a comparatively fine and smooth appearance. The steam pipe, E, may either be carried through both ends of the box, D, or the end of the pipe may be turned up inside the box for the steam to blow out upon the surface of the starch. If the finished yarn is wanted in the cop form for the manufacturing purposes to which it is subsequently to be applied, it is preferred to wind it upon bobbins, as delineated in the drawings hereunto attached, and then to rewind it from the bobbin into the cop form; and generally, whatever may be the use to which the yarn treated according to my improved system is to be applied, it is preferred to first wind it upon bobbins when undergoing the starching and twisting process hereinbefore described, and thereafter to rewind it if necessary. At the same time, however, I wish it to be understood that I do not by any means confine myself to this mode of procedure.

Having now described and particularly ascertained the nature of my said invention, and the manner in which the same is or may be used or carried into effect, I may observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may

be made therefrom without deviating from the principles or main features of my invention; but what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited letters patent, is,—

First, the system or mode of treating, preparing, or finishing yarns or threads, wherein a comparatively high degree of twist is imparted to the yarn whilst in a moist starched state, as hereinbefore described.

Second, the system or mode of treating, preparing, or finishing yarns or threads by boiling such threads in starch or other dressing material, and then passing them through starch or other dressing material, and twisting them whilst in a moist condition and saturated with the starch or dressing material, as hereinbefore described.—In witness, &c.

MACLEROY NEILSON.

Specification of the Patent granted to ALFRED VINCENT NEWTON, *of* 66, *Chancery Lane, in the County of Middlesex, Mechanical Draughtsman, for An Improved Furnace for Heating Soldering Irons.*—Dated June 7, 1856. —(A communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— This invention as communicated to me by my foreign correspondent, relates to a novel construction of furnace (for tinmen's use) which admits of coal being burned therein in substitution for the more expensive fuel, charcoal.

The furnace, which somewhat resembles a German stove, is made of cast iron, with a trough at bottom for holding water. The fire-place is fitted with radial cells for the reception of the soldering irons, and over the furnace is suspended a hood with a vent for conducting off the gases of combustion.

In the accompanying Drawing,—

Fig. 1, shows the furnace in sectional elevation.

Fig. 2, is a sectional plan, showing the position and shape of the cells; and

Fig. 3, is a side elevation of the furnace, showing the hood in section, as suspended over it by a cord.

The employment of a furnace for heating soldering irons so constructed as to admit of the use of bituminous or anthracite coals as a substitute for charcoal, becomes highly important when the number of persons employed in the tinman's business is taken into consideration. By the employment of the furnace there are several advantages gained, viz.:—First, the copper bits or soldering irons are heated in a more cleanly manner than it is possible to do even with charcoal used in the ordinary manner. Second, they are heated with greater certainty of being in working order. Third, the bolt or bit is preserved from destruction, as well as the tinned portion from oxidation arising from over heating, as well as protecting it from the action of the gases of combustion. Fourth, an economy is effected in using a fuel which is low priced in comparison with charcoal; and, even when that is employed, its consumption is lessened by the control of the draught without interfering with the introduction of the tools. In the ordinary fire pot the opening for the draught and the tools is the same. Fifth, the furnace answers as a stove in heating the shop; and, by dispensing with the necessity of frequent replenishing with fuel, effects a saving in attendance, besides being perfectly safe from accidentally setting fire to the building by negligence.

The following description will enable others to construct and use the improved furnace:—A, is a stove or furnace case, of cast-iron; B, the grate bars, for supporting the fuel; C, a dish at the foot of the case, for holding water; D, a smoke pipe; E, E, E, cells or small cups of cast-iron, introduced through suitable openings in the case of the furnace; F, F, the copper bits or soldering irons; G, is a cover or hood, suspended over the furnace at a height sufficient to permit of the insertion of the tools in the cells. When the day's work is done this cover may be lowered, so that its edge will enter the water of the dish, C, and thus the supply of air to the fire will be shut off. G*, is a pipe, which may be connected with a sliding one entering the chimney of the shop. This improvement renders the use of bituminous and anthracite coal an efficient substitute for charcoal.

In the use of the furnace, the fuel should surround the cells, so as to bring them to a cherry-red heat on all sides; the tools being then introduced into the cells, the heating will be accomplished in half the time required when using

the charcoal fire of an ordinary fire pot, and the amount of heat imparted thereto may be regulated simply by introducing the tools a greater or less distance into the cell. When it is thought desirable to reduce the number of the cells, they may be withdrawn and caps placed over the openings. The cost of renewing the cells, when with lengthened use they are burnt out, will be very trifling.

Having now set forth the nature and object of the invention of "An Improved Furnace for Heating Soldering Irons," as communicated to me by my foreign correspondent, and explained the manner of carrying the same into effect, I wish it to be understood, that, under the above in part recited letters patent, I claim constructing a furnace provided with cells, substantially in the manner described, for the purpose of heating soldering irons.—In witness, &c.

ALFRED VINCENT NEWTON.

Specification of the Patent granted to EDMUND TOPHAM, *of Mansfield-road, Nottingham, for Apparatus for Cleansing out the Sediment from the Water in Steam Boilers, and Preventing Incrustation of the same.*—Dated April 26, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in adapting to the interior of steam boilers, and in the direction of the length thereof, one or more rotating rods or spindles, around which are fixed or formed a series of detached plates, or one continuous plate or blade, constituting a screw; the purpose of which is to remove the sediment contained in the water from the bottom or other desired part of the boiler from time to time, and by these means to prevent incrustation in the boiler, a circumstance of constant occurrence with steam boilers as generally constructed, by which they become much injured, and the effect of the fuel very much lessened.

In order to explain my said invention as completely as possible, I now proceed to describe the best means I am acquainted with for carrying the same into practical effect, reference being had to the illustrative drawing hereunto

annexed, and to the numeral figures and letters of reference marked thereon respectively, as follows:—

Description of the Drawing.

Fig. 1, is a longitudinal and vertical section of a square-end boiler, showing my invention applied thereto.

Fig. 2, is a transverse and vertical section of the same, through the line, A, B, at fig. 1. At each of the foregoing figures I employ similar letters of reference to denote corresponding parts, in so far as such parts appear or can be seen at each of the said figures respectively.

At figs. 1 and 2, A, A, is the boiler, within which the following parts are placed:—B, is a screw which extends nearly the length of the boiler, one end of which is supported by the stay or bracket, C, through which the spindle, *a*, works; the other end of the spindle or rod, *a*, works in a steam-tight stuffing-box, *b*, on which the wheel, *c*, is fixed, which gives motion to the screw, B, and causes it to rotate at or about the usual working level of the water in the boiler, and is employed for removing any scum that may arise on the surface of the water, the said scum being discharged through the outlet pipe, D, to which is attached a cock or valve into a suitable culvert. At or near the bottom of the boiler a screw, E, is placed, one end of which is enclosed in the pipe or chamber, F, the said chamber being securely fixed in any convenient manner to the bottom of the boiler, and having an outlet, G, to which is attached a cock or valve and pipe, H. This pipe proceeds to a suitable culvert or other discharge. One end of the spindle, *d*, on which is fixed a wheel, *f*, which imparts motion to the screw, E, passes through the stuffing-box, *e*, the other end works in a bearing, I. The said screw, E, is employed for the purpose of removing any sediment collected at the bottom of the boiler, and discharging it through the outlet, G. K, is a lever, to which is connected the rod, L, by a pin at *g*, which rod works through a stuffing-box, *h*, made secure on the top of the boiler, the other end is attached to the lever or arm, M, by a pin at *i*; the said arm is securely keyed on to the spindle or rod, N, (supported by brackets or stays, N^1, N^1, securely fixed to the boiler,) on which are keyed the arms, O, O, to which are securely attached the rods or spindles, O^1, O^1. P, P, are a series of scrapers working loosely on the rods or spindles, O^1, O^1. I would here remark that I do not confine myself

to any particular method of working the aforesaid screws or scrapers, as I can either work them by lever, rotatory motion, steam, or self-acting, different descriptions of boilers requiring a different application. Thus, it will be obvious, that by imparting motion to the handle, G¹, of the lever, K, which is transmitted by means of the rod, L, to the levers or arms, M, and O, O, and thus gives a reciprocating motion to the scrapers, P, P, and in this manner and by these means the water in the boiler may be agitated, and the sediment in the water kept in suspension instead of being allowed to precipitate and become incrustated upon the boiler. The above apparatus having been put in motion, there is immediately a cock opened, through which the water mixed with the sediment is forced by means of the pressure of the steam and water in the boiler, as fully set forth and described in a former patent, granted to me the 11th day of August, 1855, intituled, apparatus for cleansing out the sediment from the water in steam boilers, and preventing incrustation of the same. Should any sediment collect at the bottom of the boiler, a rotatory motion is given to the screw, E, by means of the wheel, *f*, or other mechanism, and by these means and in this manner is propelled or conveyed into the chamber, F, and by the pressure of the water through the aperture, and discharged through the cock and pipe, H, into a suitable culvert. The same means is employed for expelling any scum that may arise on the surface of the water in the boiler by means of the screw, B, to which a rotatory motion is imparted by the wheel, *c*, (or other mechanism, as before referred to,) and by these means and in this manner is propelled or conveyed by the pressure of water through the pipe, D, into a suitable culvert or other discharge. It will appear evident that the particular arrangement of the above apparatus will depend upon the shape of the boiler, and must therefore be so arranged as to prevent the accumulation of sediment at the angles of the boiler; and, should the peculiar shape of the boiler require it, more than one of the before-mentioned apparatus may be employed for effecting the above object, every description of boiler requiring a different application.

Having now fully described and set forth the nature and object of my said invention of apparatus for cleansing out the sediment from the water in steam boilers, and preventing incrustation of the same, together with the best means

I am acquainted with for carrying the same into practical effect, I would remark, in conclusion, that I claim,—

Firstly, as my invention, the use and employment of one or more rotating screws or perforated tubes, combined or separately, as may be found most advantageous, for the removal of the sediment from the bottom of the boiler, arranged, combined, and constructed in the manner and upon the principle above stated.

Secondly, I claim the use of a screw or screws for the purpose of agitating the water, or removing the scum from the surface of the water in the boiler.—In witness, &c.

EDMUND TOPHAM.

Specification of the Patent granted to JOHN HENRY JOHNSON, *of* 47, *Lincoln's-inn-fields, in the County of Middlesex, and of Glasgow, North Britain, Gentleman, for Improvements in the Manufacture of Safety Paper.*—Dated June 11, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.— The said invention relates to the production of a safety paper or tissue by the intermixture of chemicals with the pulp before its manufacture into paper, or by impregnating papers or tissues after manufacture with solutions of the same chemicals.

The objects to be attained by this invention are, the avoidance in the manufacture of chemicals injurious to the health of the workmen employed; the preparation of the paper or tissue in such a manner that the ordinary or other inks afterwards used upon such papers or tissues will penetrate into and through them when such inks are attempted to be removed by chemical means, and so that all the chemical means employed by forgers or others with a view to remove the writing or printing from such papers or tissues will leave indelible marks or stains upon them; the preparation of the paper or tissue in such a manner as to prevent any transfer of any writing or printing being made from the paper or tissue; the preparation of the paper or tissues intended to be employed for bills, cheques, shares, coupons, and similar documents in such a manner that such paper or tissue cannot be tampered with prior to actual use.

According to this invention, I employ a solution, more or less concentrated, either of iodide of potassium, or iodide of ammoniacal sodium, or of bromide of the same ammoniacal bases, or of any salt or matter which contains iodine or bromine, either in a free or combined state, whether in solution, combination, or simple admixture. This solution, combination, or mixture is introduced into the pulp of the paper before its manufacture; or if used in a thick state it may be applied to the whole or portions of the paper or tissue in any convenient manner, such as by printing or painting with a brush; or I make a bath with the solution, in which the paper or tissue is immerged, and then withdrawn and dried as it is required for consumption.

It will be obvious that the preparations may be applied in the sizing of the paper or in the dressing of the tissues.

As it is not only the soluble combinations of these substances (iodine, bromine, and ammonium) which can be employed in the preparation of safety paper, I propose to use not only the soluble combinations of iodine and bromine, and ammonium, but also those which are insoluble, especially those which contain fluorine, cyanogen, and fecula in any state.

In certain cases delible or indelible stamps, marks, signs, or patterns, and delible or indelible water-marks may be employed, serving as guides, by which forgeries or transfers may be detected.—In witness, &c.

JOHN HENRY JOHNSON.

Specification of the Patent granted to WILLIAM DENNY RUCK, *of Toppings-wharf, and* VICTOR TOUCHE, *of* 14, *Rathbone-place, Oxford-street, in the County of Middlesex, for Improvements in the Manufacture of Paper from Fibres not hitherto applied to such Purpose.*—Dated June 7, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in the manufacture of paper from the fibre of the stem and leaves of sugar cane, the stem

and leaves of the Indian corn, the stem and leaves of bulrushes, and the material called bass or bast. And we prefer to obtain the fibre from these matters by first crushing and then boiling them first in water and then in alkali, and the fibre thus obtained is bleached and made into paper in the ordinary manner.

Having thus stated the nature of our said invention, we will proceed more fully to describe the manner of performing the same.

In manufacturing paper from the stems and leaves of the sugar cane, also from the stems and leaves of Indian corn, also from the stems and leaves of bulrushes, and also from the material called bass, such materials or fibrous substances are cut into short lengths (say about two inches); they are then subjected to pressure between crushing rollers or crushing surfaces, the juice, in the case of the sugar cane, having been first pressed out in the ordinary manner. The crushed fibrous substances, above mentioned, are boiled in water and then in a solution of caustic alkali for about one hour, or the boiling in water may be omitted, and the boiling in alkaline solution only resorted to; the strength of the alkaline solution may vary, but we prefer to employ 1 lb. of caustic soda to each gallon of water. The fibres after boiling in the alkaline solution are then well washed in water. In using bass, the boiling in alkaline solution may be omitted, and the fibres used after being well crushed or mechanically separated and washed. The process of making paper from the fibrous substances, prepared as above explained, is carried on in the ordinary manner of making paper from other fibrous materials.

Having thus described the nature of our said invention, and the manner of performing the same, we would state that the fibrous materials above named may be crushed or mechanically separated by other means than rollers.

What we claim is, the manufacture of paper in the manner herein described from the fibrous substances above mentioned.—In witness.

William Denny Ruck.
Victor Touche.

Specification of the Patent granted to HENRY DOUBLEDAY, *of Coggeshall, in the County of Essex, for An Improvement in the Manufacture of Starch.*—Dated July 23, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in the manufacture of starch. For this purpose a quantity of bran or husks, or like dry matters (which by combining with the gluten will render it more permeable to the water) is added to the flour or meal employed, by which means the starch may be washed out or separated by water more readily and advantageously than heretofore, and by which means fermentation and chemical menstrud for the purpose of separating the starch from the gluten may be dispensed with. By this process the gluten is preserved and may be used either as food for animals or applied to other purposes.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The wheat or other grain used having been ground, in order to reduce it to meal, a quanity of bran or it may be of husks of grain, is to be added thereto and mixed therewith. I prefer to employ the husks of oats for these purposes, and I use an addition of about one part by measure of bran, or of the husks of grain, to ten parts of meal, though the proportions may be varied. The object of the addition of bran or of husks is to render the dough more permeable to water than when the dough is made from the meal of wheat or other grain without such addition.

I would here remark that I am aware that the starch of wheat and other grain has before been separated from the dough prepared from the meal of wheat and other grain, by subjecting the dough to a kneading process under water, or when water is flowing in contact with such dough, and the process of kneading dough in the presence of water has sometimes been performed in troughs with a constant supply of water thereto, and sometimes the dough has been placed in canvas and other bags, and has been pressed and moved about or kneaded, water being in con-

tact with the exterior surfaces of such bags. I mention these facts in order to state that I make no claim to the separation of starch from dough produced from wheat or otherwise, excepting when the dough contains an additional quantity of bran or husks than is ordinarily due to the meal obtained from the wheat or grain used.

In carrying out my invention the meal and the addition of bran or of husks being well mixed together, are to be made into a stiff dough, and the dough thus produced is to be well worked or kneaded under water, or with water flowing in contact therewith, or the dough may be placed in canvas or other permeable bags and kneaded, and well pressed and worked under water or with water constantly in contact therewith, and it will be found that by reason of the addition of bran or of husks the dough will be more readily acted on by the water, and the starch will be more quickly and completely removed or separated therefrom. The state of the water flowing from the dough will, as heretofore, indicate when the starch has been removed from the dough. It may be stated that when using bags, as above mentioned, the dough may be rendered more fluid by an addition of water before putting it in bags. The starch being washed out and separated, as above explained, from the gluten by the water, it is to be allowed to settle, and the starch is to be finished in the ordinary manner. The gluten remaining, being fresh, will be suitable for the food of animals.—In witness, &c.

HENRY DOUBLEDAY.

Specification of the Patent granted to THOMAS BARNABAS DAFT, *of the Irish Engineering Company, Dublin, for Improvements in the Manufacture of Cast Iron Pipes.*— Dated August 4, 1856.

To all to whom these presents shall come, &c., &c.— This invention has for its object the forming of spigot and faucet ends upon cast iron pipes, true enough to make "metal to metal" joints, without turning and boring.

Chills or iron moulds are made of suitable dimensions and angle to form a spigot at one end and a faucet at the other end of cast iron pipes, they are placed upon the

pipe pattern and moulded therewith, and when the pattern is removed from the sand the spigot and faucet chills are to be returned to their respective places, and the metal being poured into the mould a pipe is cast with a spigot at one end and a faucet at the other, which would, if the pipe were broken to allow of them being brought together, most accurately fit "metal to metal;" consequently when a number of such pipes be made they would fit, spigot into faucet in a continuous manner, and the accuracy of this joint is found to be such that by simply wetting the surfaces to be united and driving them home they rust up in a few days and form a perfectly steam-tight joint, requiring several hundred pounds on the inch to separate; but generally the joints for gas and water purposes may be made by applying a luting of red lead or other suitable material, and in some cases tar will be found to form a sound and durable joint.

When lightness and great strength, together with a great resistance to separating be required, or where considerable expansion and contraction may be expected, I prefer to make spigots at both ends of the pipes and cast the faucets separately, having a double faucet or short pipe with a faucet at each end to receive spigots, the spigot of one pipe very nearly touching the spigot of another when driven home. The faucets so cast separately may be made of tougher or malleable iron, or of a quality particularly suitable for allowing the spigots being driven very tight home without splitting the sockets, and thus resist great pressure or tendency from any cause to separate. And where extreme lightness and strength is an object I prefer to have the faucets made of wrought iron, welded up into a ring or short cylinder and subjected to the action of dies and pressure, so as to produce a uniformly even surface, and accurately to fit the spigot intended for it.

A shoulder is produced at the base of the spigot, and when a malleable iron faucet is used it may be rivetted over the shoulder after the spigots have been well driven home, and be proof against very extraordinary pressure or tendency to separate. In some cases I find it advantageous to make the joints very slightly conical or plug-shaped, or even parallel, and they may also be made partly parallel and partly conical, so that considerable expansion and contraction may take place without leakage. In cases where

the joints are parallel the spigots may be driven to touch each other, and assist materially in making a good joint.—In witness, &c.

THOMAS BARNABAS DAFT.

Specification of the Patent granted to WILLIAM MORGAN, *of* 48, *Gloucester-terrace, Hyde-park, for Improvements in the Manufacture of Guns and Mortars.*—Dated August 14, 1856.

To all to whom these presents shall come, &c., &c.—The invention has for its object the dispensing with the necessity of welding large masses for the purpose of making cannon or mortars of wrought iron or steel, and at the same time of ascertaining, previously to finish, the internal soundness of the parts; a flaw in the bore of a gun being fatal to its use.

The invention in question proceeds, therefore, in first making the several or distinct pieces of which the gun or hollow cylinder is to be composed, and then of uniting these parts in the manner as hereinafter explained.

Supposing the article to be manufactured to be a gun, its length would be divided into separate parts of such lengths as would be convenient to the manufacturer. Each one of these pieces may either be in the first instance forged in the solid under the hammer, and then rough bored and faced for union, or where the bore would be sufficiently large to permit the formation of anuli, this may be done by turning the slab in its length and welding the butts, or it may be overlapped. The separate parts being so forged or formed into rings, and their soundness being ascertained by rough boring, the ends are to be turned into male and female V's, made accurately to fit each other, to gauge and be brought to perfect surfaces or to within a reasonable approach thereto. The hollow cylinders thus formed, and made to fit into each other, are to be placed and held together with their joints in perfect contact and laid within a convenient furnace, or such other application of heat as will raise the parts to be joined to a welding heat; and in order to ensure the perfect union of the metal, contact of the several surfaces under heat must be assured

by means of great pressure in the direction of the axis of the cylinder, and bearing equally round the surfaces or V's, which are to be joined as thoroughly to unite them when they shall have reached welding heat. It is thus sought not only to be able to make a gun in parts, but to effect the welds so thoroughly that by the perfect contact of the surfaces, and the impossibility of scale being formed, or of dirt being introduced during the process, that perfect soundness shall be obtained.

V-joints are preferred as being apparently the best calculated to accomplish the objects in view, and, because when made in circles, they will be as cheaply and as readily made as any other forms, but the invention is not limited to that particular species of joint, the invention obviously extending to other obvious forms in which perfect contact of surfaces can be assured and the union of the parts be thoroughly effected by means of the necessary end pressure in the direction of the axis being made to operate on the joints when in a welding state.—In witness, &c.

WILLIAM MORGAN.

Specification of the Patent granted to JOHN MACINTOSH, *of Great Ormond-street, in the County of Middlesex, for Certain Improvements in the Application of Incendiary Materials to be used in Warfare.*—Dated August 6, 1855.

To all to whom these presents shall come, &c., &c.—My invention consists in methods of facilitating attack on stronghold batteries on shore, and on fleets, dockyards, harbours, towns, and other objects; and in methods of defence against the approach of an enemy. When it is desired to attack fortresses from seaward, I generate by chemical means an artificial dense and dark fog or atmosphere, capable of being prolonged at pleasure, in front of the batteries or forts to be attacked, the result of which is to drive the enemy from their guns and enable the attacking vessels to approach the enemy's works, and take up positions necessary for pouring in their broadsides unmolested by any hostile fire.

In order to carry out my invention I take coal-tar naphtha, alone or in combination with other materials, and

cause the same to be conveyed to a hostile stronghold, naval battery, or fort by the following means:—

In attacking the sea faces of such strongholds or fortifications as Cronstadt, Malta, or Sebastopol, where there is scarcely any tide, but a sufficient depth of water, I freight with the before-mentioned materials submarine steam-vessels, or vessels rendered shot-proof, having iron compartments or tanks specially adapted for containing the same, despatching them to the enemy's works; in front of which, by means of pumps, hose, and suitable outlets, a sufficient quantity of the composition is discharged upon the surface of the water surrounding or bordering the fort or battery; and I then place a ball of potassium in the entrance of the tube or hose by means of suitable cocks or taps, and renew the pumping so as to force the ball of potassium through the tube into the water, when, by its great affinity for oxygen, it will immediately take fire on rising to the surface, and inflame the entire quantity of composition previously transmitted, the consequence being the formation of a dense black, suffocating fog or vapour, which envelops the fort or battery, rushing into the casemates or embrasures, and driving away the gunners and all engaged therein. I keep up the supply of the composition for a sufficient period, so that the attacking vessels can approach sufficiently near to destroy the enemies' works, already rendered untenable and incapable of resistance. Fortresses, such as the above named, could be rendered harmless by this process, and destroyed without loss of life to the attacking vessels.

Another mode I adopt is as follows:—It being understood that the operations take place from a vessel appointed for the purpose among those about to attack the battery or fort. I take a hose or tube of suitable material, rendered impervious to the action of naphtha, and coil or wind it upon a drum, or dispose it in any other suitable compact form capable of being readily paid out from a shot-proof steam vessel in which it is placed. One end of the tube or hose being retained in the vessel from which the operation is to take place, the shot-proof steam vessel proceeds to the enemy's fort or battery, paying out the tube or hose as it progresses. When the tube is thus conveyed sufficiently near to the hostile fort or battery, its extremity is sunk to a suitable depth by means of weights and cords, which secure it from change of position, and the vessel

returns to a situation of safety; while, by means of a force-pump, I cause the composition or mixture before named to flow from the vessel appointed for the service, through the tube, the consequence being that the composition issues from the end of the tube in close contiguity to the enemy's fort or battery, and by its less specific gravity rises to the surface of the water, whereon it floats. The ball of potassium is in due course to be transmitted in order to inflame the whole, as before described, and the supply is continued as long as desired.

Under tidal influence the tube may be attached to a boat or other buoyant object, and allowed to float to the battery or fort intended to be attacked; or the composition may be discharged upon the water, and allowed to be carried by the tide or wind to the battery, and then ignited by a shell containing naphtha and potassium, or by a rocket containing potassium, or by other suitable means.

By the foregoing methods the tube or hose may be laid down at night, or in a fog, or at some other suitable time, the attacking fleet having always the advantage of choosing wind and weather, and of selecting those opportunities and positions which are alone needed to develop its formidable powers.

It may be expedient, under certain circumstances, to freight a steam-vessel with the combustible material, and to start her under the control of two or three men towards the enemy's works; when nearly within the enemy's range they light a time fuse in connexion with gunpowder, and abandon the vessel, leaving her to proceed on her course and reach the enemy's works; the consequent explosion scatters and disperses the composition and causes the combustion of the whole, creating the destructive effects previously described. In order to support the combustion of the composition in contiguity to the fort or battery, the neighbouring atmosphere is deprived of its oxygen, and to continue the combustion, oxygen is derived from the windward side, and the flame and heat rarify the air to such an extent that cold or fresh air cannot descend, consequently the battery or fort being to leeward becomes completely enveloped in nitrogen, the result of which is to drive the enemy from their guns, and enable the vessels of the attacking fleet to approach and take the most desirable positions, and pour in their broadsides unmolested by any hostile fire.

Another feature of my invention consists in filling diaphragm shells, having a bursting charge, with coal-tar naphtha, with the addition of a few pills of potassium, which shells, when fired in the ordinary manner, possess the following properties and advantages over the ordinary shells:—Striking against the walls or surfaces of a stronghold, battery, or naval fortress, these shells may either break in pieces by concussion, or they may fall into the sea without fracture. In the former case the naphtha and potassium become scattered, and fall on the surface of the water, and the potassium ignites the whole. In the latter case the shell sinks, and in due course explodes in the usual manner; the naphtha and potassium rise to the surface, and become ignited, causing the destructive results before described. But should the shell enter the casemates or embrasures, or any part of the fortress, the result is as follows:—If the shell is fractured by concussion, the naphtha becomes scattered in all directions in the interior of the battery, causing the whole atmosphere to become highly explosive by the diffusion of hydro-carbon gas, and, should flame be present, an explosion results, causing destruction to gunners and material. But if the shell should not have become fractured by concussion, the bursting charge explodes in due course, and scatters the naphtha with similar results. This shell, when fired into combustible material, possesses the most destructive properties.

Another portion of my invention consists in mixing with coal-tar naphtha, india-rubber, gunpowder, and fibrous materials, and in filling therewith carcases and diaphragm shells having a bursting charge. These shells are for the purpose of setting fire to combustible materials, and when fired and burst, the thick fibrous material prevents the diffusion or scattering of the mass, which becomes inflamed, and burns with fearful energy, causing destruction to all combustible matter within its influence. I fill diaphragm shells with coal-tar naphtha mixed with phosphorus and bisulphuret of carbon, or suitable phosphuretted paste, such as is usually employed in the manufacture of instantaneous lights, having a bursting charge sufficient to open the shells. When fired, the bursting of these shells scatters the contents in all directions, and the shower of inflammable material falling among cavalry and troops ignites spontaneously, causing their immediate disorganization and destruction. Fired into shipping, these shells, bursting on

deck or below, scatter the inflammable material in all directions, and the spontaneous combustion which arises causes inevitable and irremediable injuries and destruction to the crew, who are unable to escape except by dropping overboard, and the vessel itself is speedily consumed, aid from the crew having been rendered impossible as just described. Fired into harbours, dockyards, or towns, the result is alike destructive and decisive. I also fill the shells or carcases attached to rockets with the foregoing compositions.

I also apply my inflammatory composition to rockets, in the following manner:—I take gunpowder, and mix it with coal-tar naphtha and india-rubber, and, if desired, with fibrous materials; the mass is now pressed and formed into moulds of a size to fit the rocket shell, either in the form of separate washers, or in a complete tube or cylinder; the mass may be moulded or pressed at once into the rocket shell, having a mandril in the centre.

The object of this method is to render the powder impervious to moisture, to cause adhesion of the mass, which prevents it from cracking, and to carry fire to an enemy, in which case I coat the external surface of the rocket with gunpowder, india-rubber, and fibrous material, which become ignited after the rocket has reached its destination, causing destructive results.

I also apply my inflammatory materials to the manufacture of fusees for shells, by mixing gunpowder, india-rubber, and naphtha, and forming the mass into fuses, by which means the preservation of powder from damp and wet is effected; the fuses are easily ignited, and burn with great regularity, and they appear absolutely incapable of being extinguished, circumstances which render them of great service in ricochet practice.

In the defence of fortresses, towns, harbours, dockyards, shipping, channels, and mouths of rivers against the attack of a hostile fleet, as well as in repelling troops landed therefrom, I make use of any of the means I have described in my mode of attack according to circumstances. For example, to convey the inflammable materials to a hostile fleet, I employ submarine vessels having propelling power and furnished with iron compartments or tanks, as before described, whereby I am enabled to discharge by suitable outlets a sufficient quantity of material directly under the enemy's vessels: I then allow a ball of potassium to rise to the surface, which, igniting amongst this inflammable

material, instantly engulphs the fleet in flames and black suffocating vapour, speedily destroying life and material without risk to the submarine vessel.

The several shells described in my means of attacking an enemy may be also made available for destroying a hostile fleet.

The shells filled with the composition capable of becoming spontaneously ignited form a certain and awful agent of destruction, when employed against an attacking or advancing force landed from an enemy's fleet.

The compositions described will burn as well in mud as in water, and when a shell containing them bursts in mud or earthworks, the bursting of the charge ignites the inflammable material, and the earth, being porous and incombustible, prevents the combustion from spreading rapidly, but allows the black vapour to ooze out gradually, causing most serious annoyance to the enemy, who are utterly unable to extinguish the suffocating fog, and are hindered from carrying on their operations.

My invention may be brought to bear with satisfactory results against an enemy encamped in tents, and surrounded with materials of warfare, by opening fire upon them with my rockets and shells, especially those containing the spontaneously igniting composition, the result being a general conflagration and destruction of men and material, transforming the whole into one vast sea of fire.

In defending a fortress or town from the attack of an enemy by land, I cause ditches to be formed around the same, at a distance beyond range. In or near the town or fortress I keep a quantity of coal-tar naphtha, or composition, as described, in suitable reservoirs situated on an elevation, so that by means of mains or pipes, with branches in various directions, laid down from such reservoirs to the ditches, a powerful head or flow is thus always available for supplying the inflammable material, and rapidly discharging the same into the ditches in the event of an enemy endeavouring to cross the same; by the ball of potassium, or by a shell, the whole is inflamed, causing destruction to the enemy.

In stopping the passage of an enemy crossing a river by the aid of boats or pontoon bridges, I allow the enemy to construct their bridge, and permit any desired number to cross over, and being thus divided, I cause a quantity of the material described to flow into or upon the river, and among

the pontoons. The material or composition being inflamed by any of the foregoing methods, the pontoons are, with the advancing troops, instantly engulphed in devouring flames, with black suffocating vapour, and speedily consumed. In addition to this destruction, the enemy become divided beyond all hope of reuniting, and the advanced portion, thus cut off from assistance or retreat, fall into the hands of their opponents. Should there be a current in the river, the material may be discharged accordingly, above or below the pontoon bridge, and allowed to float or drift thereto, and being then inflamed by any of the methods described, the rapid destruction of men and material ensues.

In preventing the passage of a hostile fleet through narrow channels, suitable reservoirs containing the material or composition are placed at elevated positions, and mains with branch pipes are laid down to the channel at various distances apart, and the hostile fleet being allowed to enter to any desirable extent, the material may be discharged and inflamed, so as to cause the fleet to be placed between two fires, not only putting a stop to its progress or retrogradation, but overwhelming the crews with the black suffocating fog or vapour, and eventually, on the burning mass arriving from one direction or the other, according to wind or current, causing its inevitable conflagration. From the nature of the country or other cause, it may not be convenient to place the reservoirs on elevated sites, in which case the material is to be forced by mechanical means from the reservoirs, and caused to flow with great rapidity through the mains and pipes.

When the destruction of an enemy's vessels is not desired, the hostile fleet is permitted to enter a channel or to take up any position chosen for its attack; the inflammable material is then discharged and ignited at moderate distances from the various vessels composing the fleet, precaution being taken so to regulate the supply, that, while the flames are not suffered to acquire a sufficient magnitude to approach and injure the vessels, the black fog enshrouds the fleet in impenetrable continuous darkness, their crews being simultaneously destroyed by the stifling vapour.

The operation being completed, the atmosphere is allowed to regain its natural purity, and possession of the fleet may then be obtained.

In preventing attack from steam floating batteries, which,

being encased with iron, and rendered shot-proof, are considered impregnable, the various methods of defence before described may be adopted, and although by reason of these vessels exposing but little combustible material externally, they may not sustain important injury from the burning material, yet the circumstance of their being deeply immersed for the purpose of affording a less conspicuous mark to an enemy, is extremely favourable to the operation of my invention, as I am enabled the more rapidly to envelop them in dense clouds of black vapour, instantaneously overwhelming and destroying their crews.

The downward furnace draught existing in steam vessels towards the boiler and engine rooms greatly facilitates the effect of the foregoing operation. The black suffocating vapour is instantly drawn down to those situations, destroying the engineers and firemen, and rendering any attempt on the part of the fleet to escape impossible.

Land batteries furnished with well-served long-range guns firing my shells filled with combustible material would effectually protect a town or harbour from the attack of an enemy's fleet; or even a few shot-proof vessels, having well-served guns, firing my shells, would not only keep a hostile fleet in check, but scatter on the vessels a vast shower of burning material, causing a general conflagration and annihilation.

When it is desired to check the passage of troops through mountain passes or defiles, where there is an absence of water, I employ cotton wool, or other suitable fibrous material, which I place in various situations in the pass, and lay down some flexible hose thereto from an elevated position, whereon a supply of the inflammable material is reserved; by these means, when the enemy attempt to force or effect their passage, I saturate the fibrous material with the composition, and inflame the whole by means of a voltaic battery or other suitable method. The fibrous material acts as an immense wick, and causes the naphtha to burn with terrific effect, creating a vast black fog in the defile. Or I saturate the ground with the naphtha, without the agency of the fibrous material, the supply being maintained at pleasure. The enemy are thus enclosed between the sides of a mountain pass or ravine, a situation where, under the operation of my invention, the access of pure air is rendered impossible, the atmosphere is at once deprived of its oxygen, the troops,

suddenly enveloped in nitrogen, sink powerless to the earth under the irresistible influence of this appalling agent of destruction, and perish, suffocated in absolute darkness.

The inexpensive and expeditious method by which large quantities of coal-tar naphtha can be had from gasworks, and the lengthened period during which it can be preserved without deterioration, together with the safety and facility of applying it, are circumstances which render it of great service in military and naval warfare.

Having now stated the nature of my said invention, and the manner in which the same is to be performed, I claim the employment of coal-tar naphtha, alone or in combination with other materials, for the purposes herein described; also the application of coal-tar naphtha, to be used in or by submarine or shot-proof vessels, as and for the purposes herein described; also the application of coal-tar naphtha, alone or in combination with other materials, for the purpose of filling shells, and the mixture of india-rubber, coal-tar naphtha, gunpowder, and fibrous materials for fuses, for the manufacture of rockets and filling shells, and the filling shells with the spontaneously igniting compound, as and for the purposes herein described.

And I claim the several applications of the foregoing materials or compounds for the purpose of facilitating attack on stronghold batteries on shore, and on fleets, dockyards, harbours, towns, and other objects, as herein described; and also the various applications of the same materials or compounds to the purposes of defending fortresses, towns, harbours, dockyards, shipping, channels, and mouths of rivers, against the attack of a hostile fleet, as herein described; also the method of destroying an enemy's camp, as described; and the method of defending a fortress or town from the attack of an enemy by land; and the method of stopping the passage of an enemy crossing a river by the aid of boats or pontoon bridges; also the method of preventing the passage of a hostile fleet through narrow channels, as herein described; and also the mode of obtaining possession of an invading hostile fleet without causing injury thereto, as described; also the method of preventing attack from steam floating batteries and shot-proof vessels; and also the method of checking the passage of an enemy's troops through mountain passes, and the mode of repelling troops landed from a hostile fleet; and, finally, the employment of coal-tar naphtha,

alone or in combination with other materials, and also the compounds named herein, as well as the methods of their application, as herein described, for and to all other purposes of warfare.—In witness, &c.

JOHN MACINTOSH.

Specification of the Patent granted to JEAN LOUIS LUCAS *and* ALBERT DE BRIGES, *Chemists, of Paris, in the French Empire, for Improvements in Preparing certain Liquid or Solid Alimentary Substances from the Husk of a certain Fruit.*—Dated July 15, 1856.

To all to whom these presents shall come, &c., &c.—The object of our invention is the preparation of liquid and solid alimentary substances from the pericarp or outer shell or husk of the walnut, for which purpose we have made a variety of experiments on the fermentation of the walnut husk mixed with sugar, and in its treatment, so as to produce from it a drink or beverage, or a concentrated juice or preserve, or a solid article of food. It was found necessary to avoid as much as possible the inconveniences arising from the use of yeast or other artificial ferments, which often communicate an unpleasant flavour to the beverages prepared with them, when such flavour is not overpowered or covered by the addition of a large proportion of aromatic substances. An insufficient alcoholic fermentation was also to be feared, as well as the production of putrefiable mucilage, and it was necessary to guard against the excessive oxidation of the walnut husk, which is acted on very rapidly by the oxygen of the atmosphere. We have succeeded in overcoming these difficulties by rapidly tearing up the husk, pressing it immediately, and placing the juice in contact with a syrup or solution of sugar of variable strength, according to the purpose for which it is required, and which may be subsequently diluted with water if required. Fermentation soon takes place, or may be accelerated if required by the addition of yeast or other ferment. By proceeding in this manner we are enabled to convert the husk of the walnut into liquid and solid alimentary substances adapted for the food of men and animals.

. . .

By proceeding in the following manner we prepare a juice which is easily transportable, and which may be preserved for a long time, and is adapted for the preparation of a beverage which may be employed in lieu of wine, or cider or beer:—We take the husk or pericarp of the walnut, at any period of its growth, but by preference when it is green and before the fruit has ripened. It is fermented as hereinafter mentioned, and the fermented pulp is pressed by means of a hydraulic or other press, so as to extract the juice as quickly as possible, and to protect it from being oxidized by the air, which would produce an acid identical with or similar to butyric acid, the presence of which in the drink or beverage is to be avoided by all means. By extracting the juice as rapidly as possible, and receiving it in vessels which are immediately closed, the saccharine fermentation is prevented from passing into the putrid fermentation. The strong juice thus obtained, being kept out of contact with water or air, or other oxidizing agents, may be preserved for years with all its aromatic properties, and may be carried on long voyages for the use of sailors and others. We prepare a solid alimentary substance in the following manner:—The husks of the walnut are placed in heaps, and allowed to undergo a spontaneous fermentation, by which they are converted from a bitter disagreeable substance into a soft sweet pulp, somewhat similar to baked apples in taste and smell. This pulp (with or without the addition of sugar) is then baked in an oven, which may be heated by hot air or by steam, in such a manner that the temperature may be easily regulated. A solid or pasty aliment or jam is thus obtained, which may be used for the food of men or animals. In preparing both the solid and liquid substances, we avoid as much as possible oxidation or the addition of water. This is effected with the liquid preparation by adding sugar, or by placing it in vessels carefully closed, and with the solid preparation by baking it immediately, with or without the addition of sugar. These liquid and solid products may be used in various ways. The liquid products may be evaporated or concentrated to a thick or pasty consistence, as may be required. To produce a beverage or fermented liquor, we mix from ten to twenty pounds of the juice with twenty gallons of water, and we add immediately from ten to forty pounds of sugar. It is preferable to dissolve the sugar first in the water, and then to add the juice to it,

the better to avoid any oxidation. The mixture is placed in close vessels, and immediately begins to ferment, and the fermentation proceeds in a similar manner to that of wine or cider, but it lasts a longer time. A cask of this beverage may be gradually consumed, and may remain in use for a long time without becoming sour or spoiled, as the tendency to oxidation, which is so great in the first stage of the preparation, has now disappeared. The substance, after being combined with sugar and water, proceeds gradually through the alcoholic and acetous fermentations in the ordinary course, but less rapidly than wine or cider. We have also found that this substance, being obtained without the aid of heat, and free from any empyreumatic flavour, produces spirit and vinegar of good flavour. Moreover, the mixture of the juice during its fermentation with various saccharine substances, more or less charged with aroma, modifies advantageously their aroma, and destroys in many saccharine substances certain disagreeable or objectionable flavours, which interfere with their use. We also introduce the unfermented juice of the walnut husk mixed with sugar in aerated liquors, and we employ the walnut husk or its juice in lieu of or mixed with hops in the preparation of beer. We also dry or desiccate the walnut husk when it is required to preserve it for some time before treating it as hereinbefore described.

Having now described the nature of the invention, and in what manner the same is to be performed, we wish it to be understood that we do not confine ourselves to the proportions hereinbefore mentioned, as the same may be varied;

But what we claim is,

First, the new application of the walnut husk to the preparation of liquid and solid alimentary substances, by combining it with sugar or saccharine substances, as hereinbefore described.

Second, the mode or modes hereinbefore described of treating the walnut husk, so as to obtain a juice capable of being preserved, or a beverage similar to sweet wine or cider, or a spirit or vinegar, or an unfermented syrup suitable for mixing with aerated liquors, as hereinbefore described.

Third, the mode or modes of treating the walnut husk by spontaneous fermentation and the action of heat, so as

to produce a solid or pasty alimentary substance, as hereinbefore described.

Fourth, the application of the walnut husk or its juice, in lieu of or together with hops in the manufacture of beer, as hereinbefore described.—In witness, &c.

JEAN LOUIS LUCAS.
ALBERT DE BRIGES.

Specification of the Patent granted to BENOIT FREDERIC ORTET, 39, *Rue de l'Echiquier, Paris, in the Empire of France, and of* 4, *South-street, Finsbury, London, Gentleman, for A New Metallic Composition, applicable to the Coating of Surfaces, and to the Moulding and Casting of various Objects.*—Dated July 12, 1856.

To all to whom these presents shall come, &c., &c.—Up till this time iron pyrites has only been utilized for the extraction of the sulphur it contains, and for the manufacture of sulphuric and sulphurous acids and sulphate of iron. Now, my invention consists in treating iron pyrites either alone, or in combination with iron ore, or sulphur, or products containing sulphur, by which I produce a substance which I call ferreine, which is susceptible of being moulded, and which I apply to the manufacture of cisterns, basins, and pipes for conducting water, and to the construction of pavement, floorings, roofs, and the foundations of houses, for the coating of surfaces, and for other useful purposes.

I will now proceed to describe the mode of producing the substance I call ferreine. I employ two boilers of a given capacity, connected by a tube adapted to their lids. In one of these boilers I place yellow iron pyrites, or other product containing sulphur, such as the sulphurets, but by preference the natural sulphuret of iron, on account of its abundance and cheap price. In the second boiler I place powdered pyrites or iron ore. The fire under the first boiler being lighted, the pyrites is melted, and the sulphur (about fifteen per cent.), given off under the influence of the heat, distils over to the second boiler, heated to a low temperature, by means of which the sulphur combines with the iron ore in the second boiler, and produces a bisulphuret of iron, which I term "ferreine."

I produce ferreine in various ways, according to the intended application: first, I prepare the ferreine by melting the pyrites direct without distillation; secondly, by adding to it sulphur; thirdly, by mixing with it other sulphurets; fourthly, by preparing it artificially with ores containing sulphur and iron combined in any proportions. The different changes which the ore undergoes during its treatment cause it to acquire properties which render it completely inalterable under the effect of air, water, and acids.

The ferreine when produced must be submitted to the moulding and casting processes, for the purpose of obtaining the required result, when it may be painted, gilt, or bronzed, like the metals.

Having now described the nature of my said invention, I would have it understood that I do not confine myself to the precise details herein laid down, so long as the peculiar character of my invention be retained;

But what I claim is,—

The employment and treatment of iron pyrites, either alone or in combination with sulphur, or with substances containing sulphur, for the production of a substance which I call "ferreine," and which is applicable to the manufacture of various articles, and to the construction of pavement of streets and foundations for houses and for other useful purposes, as hereinbefore described—In witness, &c.

Benoit Frederic Ortet.

Specification of the Patent granted to James Alexander Manning, *of the Inner Temple, London, Esquire, for Improvements in the Manufacture or Production of Manure.* Dated July 5, 1856.

To all to whom these presents shall come, &c., &c.—My said invention relates to the manufacture or production of an artificial manure or fertilizing agent for general agricultural purposes from the waste matters of towns and other localities, combined with other ingredients hereinafter specified. And in practically carrying out my said invention, I make use of various waste matters and other ingredients, which, for the convenience of specific description, I shall divide into the following classes:—

The first class consists of blood, bones, offal, hoofs, horns, and skins of animals slaughtered in public or private slaughter-houses; meat condemned as unfit for human food; cattle, horses, asses, pigs, slaughtered at knackers' yards or other places, or which have died by disease or accident; other dead animals, such as dogs, cats, rats, and other vermin; broken victuals and bones from prisons, union workhouses, hotels, eating-houses, and private establishments; the fatty matters and refuse meat from poultry markets, butchers' shops, hair, wool, old articles of horn, horn dust, old leather, articles such as boots and shoes, and skinny matters of every kind.

The second class comprehends fish of every kind, fresh or stale, from markets, private fishmongers, or fish-curers, more particularly the offal of fish, such as the heads, tails, bones, and guts or entrails, and such as is obtainable at the great fish-curing establishments of the United Kingdom, and also the cake or refuse of whale and seal blubber after the oil has been expressed therefrom.

In the third class are the refuse of vegetable markets and all the waste or refuse of vegetables or leguminous matters used as food; damaged, diseased, or decayed vegetables and fruits; damaged flour, and marine plants, particularly that known by botanists as the *fucus nodosus.*

In the fourth class are marine plants, tanners' spent bark, sawdust, leaves, berries, old matting, old sacks and tarpaulins, rushes, woollen and linen rags, and waste cotton, hemp, flax, and paper.

In the fifth class are fœcal matters from privies and cesspools, which have no connexion with the drains or sewers of towns, and all animal excrements.

In the sixth class are cow-wash, stale urine, also the diluted or undiluted urine from public urinals, railway stations, and factories, and gas liquor, or the liquor from the gas purifier, as well as all other liquids containing an ammonian solution.

And, finally, the seventh class consists of certain manufacturers' waste matters, such as the refuse animal charcoal from sugar refineries, and from the prussiate of potash factories; the chips or cuttings of skin from glue factories, and the chippings, dust, and shavings of horn and whalebone, used lime from gas purifiers, the scum from sugar boilers, and the waste water from public lavatories or wash-

ing-houses, as also the factories in which oily or saponaceous matters are employed.

In treating the matters mentioned under these said seven classes for the manufacture or production of manure according to my invention, the animal and vegetable substances alluded to may not always be subjected to the action of fire; sometimes all, and particularly some of them, are subjected to the process of dissolving or reduction by sulphuric acid alone; but I reserve to myself the right of treating them by acid alone, as well as by the action of fire in the first instance, and afterwards by acid.

All the animal substances are subjected to the action of fire in closed retorts of the ordinary form, but which, when constructed for any of the matters except blood, are formed with a concavity in their bottom surfaces, for the collection of fatty matters, which are drawn off by pipes into a vessel placed for their reception. Each retort is fitted with a tube on the top, to allow the nitrogenous or ammoniacal vapours to ascend and pass into a vat or vessel charged with sulphuric acid. In these vats or vessels the nitrogenous or ammoniacal vapours are fixed and solidified, and converted by the action of the acid into minute crystals of sulphate of ammonia. After this, the dried blood from the blood retorts, and the partially carbonized animal matters, together with bone ash, are placed in dissolving pits, which may be conveniently constructed of brick-work and cement, either in the ground or upon the factory floor, there to be dissolved by means of sulphuric acid. To the masses undergoing solution in this way are added the matters mentioned in the second, third, and fifth classes.

The matters mentioned in the sixth class are subjected to distillation in large iron stills, and the nitrogenous ammoniacal vapours pass, by means of a pipe connected with the still pipe, into the bottom of a sulphuric acid receiver or chamber lined with lead, and of a convenient form, being by preference deep and narrow. The sulphuric acid becomes charged with minute crystals of sulphate of ammonia, and it is acid so charged which is by preference used in the dissolving pits hereinbefore referred to.

In order to set free all the nitrogenous or ammoniacal vapours held in solution in the urine and other matters mentioned in the sixth class, a sufficient quantity of cream

of lime is injected by a force pump, or other suitable means, into each still as soon as the contents are in a state of ebullition. Great economy of time and labour results from this simple expedient, all the nitrogenous or ammoniacal vapours being forced into the sulphuric acid at one operation, it being unnecessary to repeat the boiling, as has hitherto been practised in sulphate of ammonia factories.

The matter in the dissolving pits becomes reduced to a gelatinous semi-fluid mass, and in order to bring it to a proper consistency, and render it fit for the drying stove, it has added to it the matters mentioned in the fourth and seventh classes, those of the fourth class being previously prepared in the following manner:—A quantity of the *fucus nodosus*, or other marine plant, or of any of the matters mentioned in the fourth class, are placed in a furnace of the kind known as a "black-ash furnace," and consisting of a large arched oven communicating with the fire, the flames and gases from which run along one side, so as to throw their heat into the oven. After the materials have been subjected to the action of the heat for about an hour, the whole mass is well stirred with a long iron rod or stirrer, and the oven door is then closed again, and in about another hour the whole is raked out in the form of a finely pulverized charcoal. By this means the sea weed is prevented from "fluxing," as in the making of kelp, which would involve the necessity of grinding to obtain the powder.

The charcoal obtained in this way, together with the matters mentioned in the seventh class, are added to the masses in the dissolving pits, and the whole is well stirred with iron rakes, to bring it to a uniform thickness, and to cause the absorption of any excess of acid over and above that absorbed in the dissolving process. After remaining quiet a sufficient time, two or three hours, more or less, the whole is thrown out with the spade upon a drying stove, covered with fire-brick or fire-clay, so as to evaporate the moisture; and when it is sufficiently dry it is passed through sieves or riddled, and then packed into bags for the farmers' use.

It should be stated that to the masses undergoing reduction or solution, as hereinbefore described, there is added a quantity of fish-curers' refuse salt, a quantity of sulphate of magnesia, a quantity of supersulphate of potash, or other

mineral substances, such as nitrate of soda, according to the nature of the soil and the requirements of the crop to be grown thereon.

The matters mentioned in the fourth class, except the chips or cuttings from glue factories (which are put into the retorts with the other animal matters), and the sugar-boilers' scum (which is thrown into the acid or dissolving pits), together with the sediment or residue from the urine still after the nitrogenous or ammoniacal vapours are discharged and converted into crystals of sulphate of ammonia in the acid vats, and the remaining liquor run off, may be carbonized in the black-ash furnace, and may be afterwards employed with advantage by the manufacturer by mixing it with manures. The gas purifiers' refuse lime may be mixed with the carbonized vegetable matters and siftings, or refuse of the manure factory, to form an inferior manure.

In making five tons of manure, I prefer to use the following quantities of each of the ingredients, namely, 12½ cwt. of bone ash and animal matter, 12½ cwt. dried blood, 12½ cwt. of fish offal, 5½ cwt. of vegetable matter, 5½ cwt. human and animal excrements, 5½ cwt. dissolved sea weed, 10 cwt. sulphuric acid, 5½ cwt. sulphate of magnesia, 2½ cwt. refuse salt, 2½ cwt. supersulphate of potash, 3 cwt. sulphuric acid charged with crystals of ammonia, and 23 cwt. animal charcoal, carbonized sea weed, and other matters; in all 100 cwt. or 5 tons.

It must be observed, however, that I do not confine myself to these proportions, but give them as an example of what I find in practice to produce a good manure. Nor is it necessary to use in each case all the matters hereinbefore mentioned, as if only some of them are obtainable, the desired quality of manure will be obtainable by suitably proportioning the various ingredients as may be found desirable in practice.

Having now described and particularly ascertained the nature of the said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of my said invention; but what I consider to be novel and original, and therefore claim as the invention

secured to me by the hereinbefore in part recited letters patent, is, the manufacture or production of manure, or a fertilizing agent, for general agricultural purposes, from the waste of towns and other localities, combined with other ingredients, as hereinbefore described.—In witness, &c.

James Alexander Manning.

Specification of the Patent granted to Joseph Adshead, *of the City of Manchester, Gentleman, for A New Application of a Known Material to be Used as a Substitute for Plastering, Painting, Papering, Whitewashing, and Colouring.*—Dated July 5, 1856.

To all to whom these presents shall come, &c., &c.—The nature of this invention consists in the use or employment of the painted or distempered and varnished fabrics known as oil baize or oil cloth as a substitute for plastering, painting, papering, whitewashing, and colouring houses, buildings, ships or vessels.

In performing my invention, the oil baize or oil cloth is applied by glue, paste, or otherwise, to the walls, wainscots, ceilings, woodwork, or other parts of the houses, buildings, ships, or vessels to be ornamented or protected from the effects of the atmosphere. When the oil baize or oil cloth is used as a substitute for painting or papering, it may be applied to imitate wood, marble, or stone of different colours and descriptions, or it may be otherwise applied for general decorations. By means of this invention an economical and highly ornamental substitute is obtained for the plastering, painting, papering, whitewashing, and colouring usually employed. The oil baize or oil cloth is easily washed when soiled, and, being impervious to external moisture, it is particularly beneficial when applied in damp situations.

Having thus particularly described the nature of my invention, and the manner of performing the same, I declare that what I claim is, the use or employment of oil baize or oil cloth as a substitute for plastering, painting, papering, whitewashing, and colouring, as hereinbefore described.—In witness, &c.

Joseph Adshead.

Specification of the Patent granted to Louis Cornides, *of 4, Trafalgar-square, Charing-cross, in the County of Middlesex, for Improvements in Cementing and Uniting together Plain or Ornamented Surfaces of Glass, or in Uniting Surfaces of Glass to Surfaces of Metal or other Material.*—Dated July 4, 1856.

To all to whom these presents shall come, &c., &c.—My invention has for its object a more simple and efficient mode than heretofore practised of uniting or connecting together surfaces of glass, or in uniting surfaces of glass to surfaces of metal or other material, and consists in the use and employment for such purpose of one or other of the following improved transparent cementing compositions or solutions, which are operated upon in an air-tight apparatus of the construction hereinafter described, into which the materials to be united are placed after the contact surfaces thereof have been coated with the cementing mixture; and further, in exhausting the air by any suitable means from the chamber containing the materials to be united; and, lastly, in the application of heat to the said chamber.

I now proceed to enumerate the cementing mixtures or solutions to be employed for uniting surfaces together, according to these improvements, as follows:—Cement No. 1, is composed of four parts of gum damar, or other transparent gums or resins, mixed with one part of spirits of turpentine or other solvent. Cement No. 2, is composed of one part gelatine, one part sugar, and eight parts water. No. 3 cement is composed of four parts gelatine, one part sugar, four parts water, and one-sixteenth part of creosote, thoroughly mixed and incorporated together. In making and using cement No. 1, I proceed as follows:—I dissolve the gum with turpentine by the aid of a sand bath, and when the gum is dissolved and strained I pour a certain quantity in the centre upon one of the surfaces to be cemented, and cover the edges of the surface with paper to prevent the cement from running over the edges, and in this state I then place thereon the other surface and apply pressure to it by weights. When the process of cementing is completed, I then strip the paper from the edges thereof and dip the said edges in a thick solution, com-

posed of one part gelatine, one part sugar, and two parts water, which forms a cement to be employed to receive a mounting of strips of lead, such as are used by glaziers for glazing small squares of glass with. In using cement No. 2, I proceed as follows:—I coat the two surfaces which are to be cemented together with the cementing solution, and when the coating is dry I place these two coated surfaces one upon the other, and afterwards subject them to the action of the apparatus hereinafter described, and when the cementing is completed I then cleanse the edges of the two surfaces, and afterwards dip them in a thick solution of damar or other gum, dissolved in any suitable solvent. In using cement No. 3, I proceed as follows:—I pour a small quantity of the cementing solution upon the centre of one of the surfaces to be cemented and then place thereon the other surface to be united, and by the application of pressure I cause the solution to be spread over the entire surfaces which are in contact; I then clean the edges of the plates thus united together, and afterwards dip them into a solution of damar or other gum, as aforesaid.

The following is the construction of the apparatus before mentioned to be employed for the purposes of this invention:—The general form of the apparatus somewhat resembles a screw press, such as is commonly employed for copying letters, to the bottom of which I adapt a washer of vulcanized india-rubber about half an inch thick, and instead of making the top platten (to which the screw is affixed) flat, I form the edges thereof deeper or thicker than the middle, so that when the platten is screwed down tight upon the aforesaid india-rubber washer it leaves an air-tight space into which the materials to be cemented are placed, the depth of such chamber being in accordance with the quantity of surfaces to be operated upon at one time. The bottom of the apparatus is formed hollow, and has steam or other heat admitted thereinto.

The inside of the above-mentioned cementing chamber is put into connexion with an air pump for exhausting the air therefrom, thus causing perfect forced contact of the cemented surfaces, the heat fixing them in that position.

When it is desired to cement or unite together a larger quantity of surfaces than could be conveniently performed in the above apparatus, I then propose to construct an air-tight room upon the same principle as the above apparatus, and to operate therewith after the same manner.

Having now fully described and set forth the nature and object of my said invention of "Improvements in Cementing and Uniting together Plain or Ornamental Surfaces of Glass, or in Uniting Surfaces of Glass to Surfaces of Metal or other Material," together with the best means I am acquainted with for carrying the same into practical effect, I hereby declare my invention to consist, and I claim for the purposes thereof, the use and employment of the transparent compositions or solutions above particularly described and referred to, and the operating therewith upon the surfaces to be cemented or united in air-tight apparatus, of the construction set forth, and in the manner above stated.—In witness, &c.

LOUIS CORNIDES.

Specification of the Patent granted to WILLIAM RADLEY, *of Hill-street, Peckham, in the County of Surrey, Surgeon, for Improvements in Machinery, Apparatus, Materials, and Processes for Preparing and Treating Auriferous, Argentiferous, and Cupreous Rocks, Minerals, and Alluviums, Parts whereof are applicable to other Purposes.*— Dated June 20, 1856.

To all to whom these presents shall come, &c., &c.— My invention, consisting of several parts and operations, I shall describe under the six several heads or sections following; and,—

Firstly, of the preparation of the rock, mineral, and alluvium. If the substance to be prepared is quartzose or trappean, I break it into pieces, not exceeding a hen's egg in size, and subject it to calcination in a close receptacle or kiln, with or without an alkaline or earthy sulphide or chloride, as hereinafter said, during one to four hours, at a full red to white heat, and withdrawing it, I plunge it into water, and preferably into hot water, to render it more friable and easy to crush and grind. When the mineral is pyritic, I roast it in a similar kiln or other receptacle, heated by convenient furnaces and flues, with an aperture at top and bottom; from the upper part of which kiln or receptacle a pipe or passage leads to a dust chamber, so as to collect and separate all dust from the sulphurous fumes for use, as hereinafter described under the sixth head or

section. When the pyritic mineral has lost about one-half or more of its component sulphur, I withdraw it, as before described respecting quartzose substances, and plunge it into a solution of sulphide of potassium or sodium, barium, strontium, or calcium, more or less concentrated and sulphurated, but I prefer that of the sulphide of potassium, and especially that kind known as "liver of sulphur," or that of "balsam of sulphur;" removing it thence, I roast it in a similar manner, but at a higher temperature, in fact, at as high a temperature as I can possibly command without fusing the pyritic material. Through the incandescent mass in the kiln or receptacle, and by an aperture at the foot thereof, in the first roasting of the pyritic mineral I pass, continually or periodically, steam to facilitate the process, and in some cases a blast or artificial current of air, or other vehicle containing oxygen gas, as where it is desirable to increase the yield of sulphurous and manufacture of sulphuric acid. With respect to the proportion of sulphide to be used, no rule can be given, except that richer auriferous pyrites require more, and poorer ones less, of the sulphide, but for average specimens about 28 lbs. avoirdupois to every ton of 2,240 lbs. of the mineral. The pyritic matter, thus treated and deprived of all the sulphur that can be by roasting or lixiviation with a sulphide, is to be withdrawn, and treated, when cool, with successive washings of hot or cold water to abstract all soluble, alkaline, or earthy sulphide, and being then left to dry, it is ready for further treatment. When the pyritic substance is withdrawn from the kiln or receptacle after the first roasting, it may be sprinkled with any of the sulphides in powder, or a powdered sulphide or chloride may be introduced into the kiln or receptacle, and sprinkled upon the incandescent substance, instead of steeping it therein.

The second part or section of this specification relates to crushing and grinding the aforesaid or any substance, which I perform as follows:—The material to be crushed is to be introduced into a machine, which I denominate a gyro-stamper, and constructed thus,—a basin or mortar of cast iron or stone of the general form of an apothecary's mortar, but instead of being hemispherical in its cavity, I prefer to make it paraboloid, and identical with one-half or less than one-half of an ellipse, sectionally of small eccentricity, cut in the sense of its transverse diameter. I prefer to make it four feet wide at the brim and two feet six inches in vertical

depth, about six inches in thickness in the bottom, tapering radially to about two inches in thickness at the brim, with a strong flanch outside its bottom by way of a foot to fasten it down by, and an aperture about four to six inches in diameter in the centre of its bottom to effect the discharge of the crushed material spontaneously. The curvature of the cavity may, however, be varied from a greater to a lesser eccentricity, and *vice versâ*, according to the nature of the material to be crushed and incipiently ground, making it greater for more friable, and less for harder minerals and materials. To this mortar I adapt a pestle head of cast iron, steel, or stone, in the general form of this well-known instrument, whose lower surface shall answer and adapt itself to that of the elliptic mortar, and occupying or covering from one-half to two-thirds of the concave surface of the same. To this pestle head I attach a cast, but preferably, a malleable, iron helve, connected above or below with a source of continuous circular motion, and provided also with a cam or rack motion to lift the pestle occasionally upwards, to fall again upon the materials to be crushed and ground lying within the cavity of the mortar aforesaid. The upright drilling machine may be given as an instance how to effect this gynglimo-circular motion required for the pestle, which any engineer can execute; or the mortar may be made to revolve upon its foot, supported upon friction rollers set in a strong cast-iron anvil or sole piece, or by balls placed in a circular channel therein, containing oil, fat, or other lubricating material. The weight of the pestle heat and helve, and the height from which it should fall, must be regulated by the hardness of the material to be crushed, but as a general indication 12 to 15 cwt. will do for the one, and the heighth to be raised may be twelve inches, more or less, but never less than about three inches, to enable the lumps of material to roll or get underneath the pestle head; and the proportion of strokes to revolutions of the pestle or mortar, as the case may be, should vary with the nature of the material, being for average stuff about one stroke for every revolution, so as to exert both a crushing and a separating action. From the aperture in the bottom of the mortar of the gyro-stamper a shute will transfer the broken material over the brim and into the cavity of the grinder proper, denominated "the muller." This machine consists, like the preceding one, of a mortar and a pestle, with

this difference, that the cavity of the muller mortar is to be made hemispherical, and with about one-half more width at brim than the gyro-stamper mortar, of the same or less thickness of material in the bottom, but provided with a central aperture of spontaneous discharge in the bottom of similar diameter. To the cavity of this mortar a hemispherical muller must be adapted, to whose upper surface a helve or shaft must be attached, of length about triple that of the semi-diameter of the brim of the mortar or muller basin, and fixed by a binnacle or universal joint at about a distance from the face of the muller, equal to the semi-diameter or depth of the basin from the brim to the bottom, to a stay or bearer firmly fastened upon and across the brim of the basin, so as to allow of and compel the muller to adopt a circular, and also at the same time a sidling or oscillating motion within the basin of the muller, provision being made in the centre of the universal joint by a box and key piece, that the muller shall bear with its full weight upon the material to be levigated, whether it be coarser or finer. The opposite end of the helve or shaft of the muller is to be connected with an arm or crank fixed upon the lower end of a vertical shaft, made to revolve, by suitable gearing above, in such a manner that when the arm or crank revolves, a circulating motion will be given to that end of the helve, and a corresponding motion to the muller within the basin or mortar, provision being also made in the arm or crank for a fixed screw, or pair of screws, of two or more threads, to be stepped or centered therein or thereto, whose nut shall carry a piece of metal or swivel to transmit and carry round with the crank the upper end of the helve, either in a fixed or loose condition, so as to impart to the face of the muller a rotatory as well as a circulating motion within and on the concave surface of the basin; and also, that by the direct and reverse action of the screw or screws alternately, the muller may operate sometimes on one side, sometimes on the other, and sometimes in the middle of said basin or mortar alternately. To effect this direct and reverse action of the screw or screws, and thereby also the backward and forward traverse of the nut from the central to the terminal end of the crank or arm, and *vice versâ*, a toothed pinion, fixed upon the outward end of the screw, and jutting beyond the end

of the arm or crank, may take into the teeth or cogs of a similar rack, in two separate halves, the one-half of whose teeth shall engage the upper and the other half the lower side of the pinion alternately; or a channel, in the form of a double spiral or volute, formed upon the lower face of a revolving plate into which the top of the helve takes, will effect the same sort of motion. The muller basin, instead of being a fixture, may be set and fastened upon the upper end of a vertical shaft, similarly provided and constructed as the helve of the muller, whereby a compound double or triple motion, like unto that of the muller, may be given to it in a contrary direction to that of the muller, or the two may partake of these motions respectively in a direct and retrograde manner, and the gyro-stamper as well as the muller may work, when grinding minerals or alluviums, with or without the use of water or mercury, but when water is used and not mercury, I prefer to dry the pulverized material before subjecting it to the process of amalgamation hereinafter and now to be described.

The third part or section of my invention relates to the machinery and apparatus for effecting the process of amalgamation of gold and silver as a separate and distinct operation, and consists of an amalgamated barrel, a mercury retort and furnace, and an amalgam separator. The amalgamating barrel consists of a cylindrical vessel of strong sheet or cast iron, resting upon triangular supports by its lower convexity. Into this barrel a skeleton drum, consisting of a hollow axle, with hollow tubular arms, and tubular tyres, with tubular cross pieces from tyre to tyre at the ends of the arms, all continuously tubular throughout with and from the axle, is introduced, and made to revolve. The tubular cross pieces, 4, 5, or 6 in number, are to be perforated with holes of about one-eighth of an inch in diameter at their sides, contrary to that of the direction of motion to be imparted to the drum. To one end of this axle a speed pully is to be fixed, with a corresponding pulley on the shaft that imparts motion to the drum, so as to render the speed of its revolution variable at pleasure, whilst to the other end of the axle a tube of iron, leading to and from the mercury retort reciprocally, is adapted by means of a metallic gland that will admit of motion in the axle with imperviousness to mercurial vapour in the tubular connexion. To the tubular cross pieces aforesaid are to be

firmly attached paddle plates of malleable or cast iron, bearing upon and being stayed by the ends of the drum arms, the plates to be about one-fourth to one-sixth the diameter of the barrel in breadth, perforated with holes about one inch in diameter, and so adjusted as almost to scrape the cylindric concavity of the barrel. This amalgamator may be modified by causing it to revolve on its axis, the tube bringing the vapour of mercury to merely enter the centre of the barrel by the bush axis, or the barrel may be fixed as before, the mercurial vapour being merely led into its cavity by a hole in the end near the top, whilst the drum and paddle plates revolve therein, as before stated. In any case a sufficiently large aperture, with cover, must be made in the upper part of said barrel, and in the case of fixture, another similar aperture and cover in the end of said barrel close to the side at bottom, the one to afford ingress to, the other egress for, the amalgamated product and amalgam. The retort and furnace it is unnecessary to describe, as I have no invention in them, but not so the separator. This apparatus consists of a vessel of sheet iron, partly cylindric and partly conical, set and fixed vertically, with the apex of the cone downwards. Within this vessel works an agitator with vertical oblique vanes, and capable of revolving at various speeds, according to the density or levity of the different results of amalgamation which is thrown in at the open upper end of the cylinder, into one side of which a pipe delivers water, and from the opposite side another pipe conveys away the muddy water containing the earthly particles, whilst the heavy and metallic particles subsiding into the cone can be periodically drawn off by a cock or valve of iron inserted in the orifice of the cone. The muddy waters must be transferred into tanks to settle, so that, if necessary, the water can be used again, and the earthy precipitate or residue reserved for other and subsequent use, as described in the fourth and fifth sections of this specification.

The fourth part of my invention consists in exposing pyritic minerals, before or after the process of auriferous amalgamation, to the action of the atmosphere in beds, heaps, or layers, underlaid with conduits leading to tanks or reservoirs to collect and reserve the solutions percolating through. Upon these beds of material I throw water from time to time in a shower, to imitate rain, which may be

ordinary water. In those cases where I thus act upon the pyritic mineral in a ground state before calcination, I prefer to acidulate the water with sulphuric or nitric acids, or with chlorine gas; and in those cases where (as described in the first part of my invention) I have roasted it with a sulphide, I imbue the water with a corresponding sulphide, pumping the contents of the tanks or reservoirs respectively back upon the beds or layers, for continually repeated percolation through the decomposing pyritic minerals. The pyritic tailings or settlings of the separator may be treated by the one or the other of these processes for spontaneous decomposition of quartzose or pyritic minerals as their componency may determine, operating upon those containing large residuals of gold or silver by a sulphide solution or by aqueous chlorine, and upon those pour in the precious metals with water acidulated with sulphuric or nitric acids, to decompose their contained metallic sulphides, entangling the gold in favour of the formation of sulphates and nitrates. Instead of proceeding to amalgamate pyritic substances after the second calcination, they may be digested with hot concentrated solutions of a sulphide, or fused therewith in pots, crucibles, or in the hearth of a reverberatory furnace at a temperature short of that which decomposes or volatilizes the sulphide, and fluxes the earthy matter with the base of the sulphide, and acting upon the results of fusion by hot water, so as to produce hot concentrated solutions of metallic sulphides.

The fifth section of my invention relates to those quartzose or trappean rocks, minerals, and also alluviums, wherein the gold, silver, &c., is in such a state of combination, or is otherwise in a metamorphic condition, that none of the previously described processes can separate them therefrom, and consists in acting upon the substance before or after calcination, but preferably after being pulverized, firstly, with dilute sulphuric acid, to separate all matters that may be found soluble therein; and, secondly, after washing and subsidence with a proper mixture of hydrochloric and nitric acids, within a Woolfe's series, of any convenient material, or with chlorine produced from any ordinary generative mixture, the rock mineral or alluvium being diffused in the compound acid in the one case and in water in the other; or, if they can be procured at a reasonable price, I act upon the aforesaid substances diffused

in water, acidulated or not with nitric acid, by the products of the action of sulphuric acid upon fluor spar, or other body containing fluorine, within a Woolfe's series of lead or platina, and afterwards either treating it, as hereinbefore described, with a sulphide, or subjecting in its wet state to ordinary amalgamation, or, when thoroughly dried, to the process of amalgamation set forth under the third section of this specification. Fluo-silicic acid gas, or other body containing loosely associated fluorine, may be used in these processes, instead of hydro-fluoric acid gas. The resolution of the sulphides and chlorides of gold and silver, and of the sulphates of silver and copper to the metallic state, and the conversion of the sulphate of iron to a marketable condition, being well known processes to any chymist, I forbear all mention of such processes in this specification.

The sixth section of this specification, relating to the sulphureous fumes escaping or liable to escape from the processes of calcining or roasting pyritic substances generally, and particularly such as are hereinbefore described, consists in the collection of such fumes and their conversion into sulphurous and sulphuric acids for use in the several processes described in this specification, and in the processes of the industrial arts generally, which I effect in the following manner:—Beyond the dust chamber, incidentally mentioned in the first section of this specification, must be constructed a refrigerating chamber of a cylindric shape, of bricks, stone, glass, or other similar material, set in or bonded with a paste made of sulphate of lead, or other cement capable of resisting the action of sulphurous acid, with an inverted dome or slab of granite, &c., for base, and a regular dome or similar slab for cover, and be traversed with leaden tubes with cold water circulating through them; or the chamber may be made of lead and jacketed with iron, with cold water flowing through the interspace. The dust-chamber before mentioned may be similarly constructed, and made in duplicate, so that one can be disconnected to be cleared of dust, for which a suitable opening with cover must be provided, and the refrigerating chamber must be provided with an inlet above and another below, so that water may be introduced from time to time to cleanse its cavity, and for other purposes. From this refrigerating chamber a pipe must lead to and into an apparatus designated and described as a "siccatory" in the specification of Letters Patent granted to myself the 3d day of May, 1845,

"for improvements in the production of gases for purposes of general illumination, &c.," and containing lumps of chloride of calcium or other material capable of removing all moisture from the sulphurous fumes, which passing thence enter the inlet of a pump described and designated as "ram and plunger pump" in the said specification of May 3, 1845. The vapours of sulphurous acid and atmospheric air passing through and from the kiln or calcining receptacle aforesaid, being taken and exhausted by the ram barrel of this pump, will be condensed therein to about three atmospheres by the return of the ram, which receding from the plunger, will transfer the condensed vapours into the barrel of the plunger, which, on the next exhaustive stroke of the ram, will be further condensed to a sufficient degree within the conduit of the plunger and receivers or condensers beyond. This conduit leads into the upper part of a leaden or platina condenser, cylindric in form, closely and strongly covered with a vessel of the same shape made of stout boiler plates, and jacketed over and outside said covering with another iron vessel, having an interspace into which water can be introduced to absorb the excess of heat made sensible by the compressive action of the pump. Into this condenser water is introduced to absorb the acid vapours, and an opening, furnished with a valve, must be made in the side thereof near the bottom to withdraw the acid product, whilst another similar opening exists at the side near the top provided with a valve to permit the continual escape of nitrogen and other non-condensible gases. These two valves must be so weighted as that the uncondensed nitrogen and other gas or gases may pass off at a pressure of twenty to twenty-five atmospheres for sulphuric acid, thence to thirty-six atmospheres for hydrochloric, and up to fifty atmospheres for nitric and nitrous acids, whilst the acid valve will not allow of any escape at those pressures; but to allow of the condenser being emptied of its contained acid, the weighting of the valve must be capable of being reduced below that at which the nitrogen and other uncombined gas or gases escape, so as to effect the discharge of the acid easily, and without violence. A series of these condensers will be better to work than one, and the compressed gases and vapours escaping from the upper valve of the first may pass into the middle of the second, and so forth, for any number of condensers. Nitric and hydrochloric acids

may be prepared in a similar manner, without the necessity of rectification, either from apparatus purposely generating them, or as waste and noxious products of other processes. It will be obvious that a supplementary vessel must be provided and connected with each condenser to receive and hold the water necessary to recharge the condenser after its acid contents have been discharged, in such a manner that the pressure within the condenser may not bar the entrance of the water. For this and other purposes the conduit of the plunger may terminate in a conduit or other vessel of sheet or wrought iron, whence valved tubes may lead to each condenser, so that one or another may be disconnected for discharge or repairs, whilst the rest are in consecutive operation. This purpose may be effected by the method set forth in the above recited specification of Letters Patent of May 3d, 1845, under the description and designation of "the condensing main and gas holders."

Having now described the nature of my invention, and how it is to be performed, I specially claim as follows:—

And, firstly, I claim the method or methods of forming sulphides of gold and silver with an alkaline or earthy sulphide, substantially as set forth in this specification, or by any modification thereof.

Secondly, I claim the use and application of the gyro-stamper to all purposes of crushing and incipient grinding of any and every substance whatsoever, where a rotatory and a vertical action are used combinedly and alternately, or otherwise.

Thirdly, I claim the use and application of "the muller" to all purposes of fine grinding, levigation, trituration, and empastement of dry substances with water, oils, or *per se*, or otherwise, where the action of the ordinary pestle in the mortar is used and attained by the methods described, or by any other means.

Fourthly, I claim the use and method of metallic amalgamation by vapour of mercury, substantially as set forth in the third section of this specification, or by any modification of the same.

Fifthly, I claim the use and methods of decomposing pyritic minerals, and of separating their component metallic bodies and saline products, as set forth in the fourth and fifth sections hereof.

Sixthly, I claim the use and application of the machinery, apparatus, and processes set forth in the sixth section of this

specification for the manufacture of acids generally from any substances whatsoever, and especially from pyritic minerals holding copper, silver, lead, and gold, or either of them, to produce cheap acid menstrua, for the purposes of this specification and of the arts generally by compressive action, no matter how nor by what means produced.

In witness, &c.

WILLIAM RADLEY.

Specification of the Patent granted to GEORGE PYE, *of Ipswich, in the County of Suffolk, Flax Manufacturer, for An Improvement in Preparing Silk.*—Dated June 19, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in preparing silk, and consists of employing fullers' earth in order to aid in removing gum from the silk. For this purpose the fullers' earth may be used combined with water when reeling silk from the cocoons, and also together with water, steam, and pressure after reeling.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The quantity of fullers' earth combined with the water used may be varied, but I prefer to employ about 1lb of fullers' earth to every five gallons of water; the fullers' earth is well mixed with the water in a suitable vessel and then allowed to subside, and the liquor is then run off from the sediment. The fullers' earth water, when used for separating the gum from silk on the cocoons, is placed in a suitable vessel and heated by steam or other means to a temperature of eighty to one hundred degrees of Fahrenheit. The cocoons are to be kept immersed therein for several hours (say about twelve) till the silk comes off freely and does not adhere to the cocoons, by reason of the gummy matters becoming soft, and I find that such gummy matters remain soft and are readily removed by the next process, which consists of subjecting the skeins thus obtained, or skeins of thrown silk produced therefrom, into a further quantity of fullers' earth water, and the silk is allowed to remain in such liquid for about twelve hours, the fullers'

earth water being kept heated during that time by steam or other convenient means to a temperature of eighty to one hundred degrees of Fahrenheit, after which time the liquid is raised gradually to a boiling heat, during which boiling the silk is alternately pressed and allowed to expand till the gum or adhesive matter is removed; and this, I believe, will be most conveniently accomplished by means of apparatus described in the specification of a former Patent granted to me and John Watson Burton, dated the 20th day of March, 1856. And after the removal of the gummy matters has been accomplished and the fluid run off, clean water is to be applied, as therein described, to cleanse the silk, by which processes the silk may advantageously be freed from the gummy and adhesive matters, and be then dried and be ready for the subsequent ordinary processes. In like manner may imported silk, already wound off from the cocoons, be treated; and such is also the case with regard to silk waste, the process, however, of removing the gummy matters by fullers' earth and water taking somewhat longer time when applied to silk which has not been wound off the cocoons by the aid of fullers' earth water.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that what I claim is, the subjecting silk to the action of fullers' earth in water in order to remove the gum or adhesive matters therefrom.

In witness, &c.

GEORGE PYE.

Specification of the Patent granted to CHARLES ARMAND MESSAGER-ABIT, *of* 39, *Rue de l'Echiquier, Paris, in the Empire of France, and* 4, *South-street, Finsbury, London, for Certain Improvements in the Treatment of Fibrous Substances.*—Dated June 28, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in treating the plants called ligneum spartium, stypa tenasissama, the chamærops humilis, and the plants of the genera genista and stypa, for the purpose of obtaining fibrous materials therefrom. The above-

named plants are first submitted to bruising cylinders. The fibres obtained from this operation are afterwards straightened, then placed carefully in small bundles, and carded, when in a cold state, in a suitable carding machine. This operation being completed, the fibrous substances are dyed, twisted, and dried by the ordinary processes.

I also treat the sparta or alpha, and the dwarf palm, and other plants of the growth of Spain and Algeria, by the application of steam, by which, in conjunction with the above processes, I am enabled to obtain a substitute for horse-hair, which I call vegetable horse-hair; with the above-named plants I am also enabled to manufacture by the ordinary processes paper pulp, carpets, and cordage of every description.

Having thus described the nature of my said invention, and in what manner the same is to be performed, I would have it understood that what I claim is,—

First, the treating the plants ligneum spartium, stypa tenasissama, the chamærops humilis, and the plants of the genera genista and stypa, for obtaining fibrous materials therefrom, as hereinbefore described.

Secondly, the treating the sparta or alpha, or the dwarf palm, and other plants of the growth of Spain and Algeria, for the production of a substitute for horse-hair by the application of steam, such plants being also applicable to the manufacture of paper pulp, carpets, and cordages.—In witness, &c.

CHARLES ARMAND MESSAGER-ABIT.

Specification of the Patent granted to JOHN HENRY JOHNSON, *of* 47, *Lincoln's-inn-fields, in the County of Middlesex, and of Glasgow, North Britain, Gentleman, for Improvements in the Production of Carbonates of Barytes.* —Dated June 27, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention relates to a peculiar process for producing carbonate of barytes, a salt which is or may be advantageously applied to various useful purposes in the arts and manufactures.

The peculiar process consists in decomposing an aqueous solution of the sulphuret of barium by the aid of carbonic

acid gas, assisted by the presence of a certain quantity of potash, soda, or other alkali. In this process the carbonic acid unites with the barium, and carbonate of barytes is precipitated, leaving, however, a slight excess of sulphate of barytes; the sulphuric acid unites with the alkali, and a sulphate of that alkali is held in solution.

If sulphate of soda be used it will be entirely decomposed by carbonic acid, pure carbonate of soda and sulphuretted hydrogen being thereby formed. Now if we add a solution of sulphuret of barium to a solution of carbonate of soda, and pass through the united solutions a current of carbonic acid gas, the sulphate of soda will be decomposed, sulphuretted hydrogen will be produced and will escape, (especially if the temperature is slightly elevated,) and carbonate of soda will be formed, which salt immediately reacts upon the sulphuret of barium, and carbonate of barytes is thereby produced. The same original quantity of the alkaline salt will serve for an indefinite time, and thus reaction goes on continuously, and the precipitation of carbonate of barytes is continuous likewise. When this carbonate has been precipitated it should be washed with pure water and dried, and it will be found to be free from sulphates and all compounds of sulphur. I obtain the sulphuret of barium either by calcining in closed vessels a mixture of sulphate of barytes and powdered charcoal, or by way of "cementation," the sulphate being broken into small pieces and calcined in a furnace similar to that employed in the calcination of lime.

With regard to the carbonic acid it is the result of the combustion of charcoal, coke, &c., in closed vessels fed with air by a blowing machine. The carbonate of barytes obtained in this manner can be applied to various useful purposes, and in consequence of its purity it may be submitted to the action of the various acids, with the view of producing salts of baryta for use in industrial operations.

It is also possible so to arrange the apparatus as either to destroy the sulphuretted hydrogen or to turn it to useful account, and this may be done either by burning the gas, or by producing from it sulphur or sulphuric acid; and thus the evils flowing from the presence of sulphuretted hydrogen in the manufactory may be avoided, whilst an article will be produced which has a commercial value, and will help to defray the expense of the manufacture of the carbonate of barytes.

In order to produce sulphur, sulphurous acid gas and sulphuretted hydrogen should be formed simultaneously, and brought together in a suitable receiver, when they will neutralize one another, the resulting products being water and sulphur. To accomplish this it is only necessary to cause two apparatus to be in action at the same time, to burn the gas of one by making it pass over a furnace, and causing the sulphurous acid thus obtained to pass into a chamber in which the sulphuretted hydrogen disengaged by the other apparatus is evolved. This product (carbonate of barytes), which I am enabled by this invention to produce in a pure state and at a very cheap rate, may be largely employed in the arts and manufactures, particularly in the manufacture of glass, crystal, enamel, pottery ware, &c., the carbonate of barytes being used wholly or partially in place of the carbonates of potash and soda in the production of silicates. It may also be employed in the manufacture of paints, and in the production of painted and glazed papers, and likewise as a mordant in dyeing in the state of acetate (or pyrolignite) of barytes, as a substitute for the acetate (or pyrolignite) of lead.

Having now described and particularly ascertained the nature of the said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of the said invention.—In witness, &c.

John Henry Johnson.

Specification of the Patent granted to Francis Gybbon Spilsbury, *of Chaudfontaine, in the Kingdom of Belgium, and of* 56, *Stones-end, Borough of Southwark, County of Surrey, Gentleman, for Making Soda and Alum.*—Dated June 19, 1856.

To all to whom these presents shall come, &c., &c.—In order to make soda and alum, I make use of cryolite, which is a mineral consisting of fluate of alumina and

fluate of soda. To separate the soda the cryolite is to be reduced to powder, mixed with its weight of caustic lime and as much water as will bring it to the consistency of milk; this mixture is to be boiled several hours, adding water as it evaporates. The fluoric acid and alumina pass over to and combine with the lime, while the soda is dissolved by the water. The liquid is to be filtered, and the filtrate washed with fresh water until all the soda is removed. The washings being added to the original liquid, the whole is to be evaporated to dryness. What remains is caustic soda, which may be converted into carbonate of soda in the usual way. Instead of boiling cryolite with lime and water, it may be previously fluxed with lime, and the mass exhausted with water afterwards, but I prefer the former method. A second mode of separating the soda consists in fusing wolfram or tungstate of iron and manganese with about the half of its weight of cryolite in a reverberatory furnace, and after the melted mass has been run out and cooled, exhausting it with water, the clear liquor evaporated to dryness produces tungstate of soda. The soda may be separated from the tungstic acid by dissolving the tungstate of soda in water, and mixing it with caustic lime in the proportion of six parts of the former to one of the latter. Insoluble tungstate of lime is then produced, and a solution of caustic soda, which is to be treated as before.

To convert cryolite into soda alum, I boil one hundred parts of powdered cryolite previously mixed with fifty-four parts of clay in two hundred and eighty parts by weight of sulphuric acid, specific gravity 1·84, until all the fluoric acid is driven off, which may either be condensed in proper lead vessels or allowed to escape into the chimney. The resulting mass must then be exhausted with water. The filtered liquid on being evaporated and crystallized yields cubic alum.

I claim, first, the extraction of caustic soda from cryolite by caustic lime and water.

Secondly, I claim the fluxing of wolfram with cryolite as well without as with the subsequent application of lime.

Thirdly, I claim the application of sulphuric acid with or without an additional portion of clay to cryolite for the purpose of producing alum.—In witness, &c.

FRANCIS GYBBON SPILSBURY.

PATENTS SEALED TO FEBRUARY 24, 1857.

January 27, 1857.

1786. HENRY ROBINSON, of Settle, for arrangements and mechanism for the conveyance or transport of loads or weights.—Dated July 28, 1856.

1787. EDMUND EABORN and MATTHEW ROBINSON, of Birmingham, for machinery to be used for confectionary purposes.—Dated July 28, 1856.

1791. WILLIAM GRIFFIN and ELIZABETH DULEY, of Northampton, for studs and buttons for fastening articles of dress.—Dated July 29, 1856.

1819. JOHN WATKINS BRETT, of Hanover-square, for letter and numeral printing electric telegraphs.—Dated August 1, 1856.

1823. EUGENE PERRE CHEVALIER, of Brussels, for cigars.—Dated August 1, 1856.

1839. JOSIAH FIRTH, of Heckmondwike, and JOSEPH CRABTREE, of Mill Bridge, for weaving Scotch, Kidderminster, and Dutch carpets by means of a power loom.—Dated August 4, 1856.

1849. ALFRED VINCENT NEWTON, of Chancery-lane, for primers for fire-arm cartridges.—Dated August 5, 1856.—(A communication.)

1867. JOSEPH LEESE, junr., of Manchester, for machinery used for printing calico and other fabrics.—Dated August 8, 1856.

1871. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for composing and distributing types.—Dated August 8, 1856.—(A communication.)

1881. ARCHIBALD LOCKHART REID, of Glasgow, for producing ornamental figures or devices on textile fabrics and other surfaces.—Dated August 9, 1856.

1885. JOHN CARTLAND, of Birmingham, for a new or improved door spring.—Dated August 11, 1856.

1907. JOHN BURNS SMITH, of Manchester, for machinery for preparing, spinning, and twisting cotton and other fibrous substances.—Dated August 15, 1856.

1921. LOUIS AUGUSTE JOYEUX, of Marseilles, for obtaining motive-power.—Dated August 16, 1856.

1930. ANDREW PEDDIE HOW, of Mark-lane, for pumps.—Dated August 18, 1856.

1931. CHARLES MARIE CHOUILLOU, of Paris, for thinning or shaving tawed, tanned, or dressed skins.—Dated August 18, 1856.

1937. ROBERT JOBSON, of Wordsley, for apparatus for pouring iron or other metals into moulds.—Dated August 19, 1856.

1941. WILLIAM EDWARD NEWTON, of Chancery-lane, for valves for steam engines.—Dated August 19, 1856.

1950. JOSEPH MAUDSLAY, of Lambeth, for steam-engines, especially applicable to screw propulsion.—Dated August 20, 1856.

2151. JOHN BUCHANAN, of Katrine, for propelling vessels.—Dated September 13, 1856.

2257. CHARLES RENSHAW, of Dukinfield, for squeezing rollers applicable to machinery or apparatus for pressing or partially drying yarns and woven fabrics.—Dated September 26, 1856.

2341. WILLIAM NEHEMIAH PARSSON, of Southwark Bridge-road, for a construction of rotary sawing machine.—Dated October 7, 1856.

2417. RICHARD FORD STURGES, of Birmingham, for rollers or cylinders for printing fabrics.—Dated October 16, 1856.

2639. HENRY BESSEMER, of Queen Street-place, for the manufacture and treatment of iron, and in the manufacture of steel.—Dated November 10, 1856.

2707. GEORGE PYE, of Ipswich, for treating and bleaching cotton.—Dated November 15, 1856.

2731. JOHN JONES, of Middlesborough-on-Tees, and EDWARD JONES, of Liverpool, for the manufacture or production and treatment of metal castings.—Dated November 19, 1856.

2749. WILLIAM MORGAN, of Gloucester-terrace, Hyde-park, for heating parts of cylinders and other hollow bodies of iron to a welding heat.—Dated November 20, 1856.

2777. WILLIAM EDWARD LAYCOCK, of Sheffield, for looms for weaving.—Dated November 22, 1856.

2788. CHARLES EDWIN HEINKE, of Great Portland-street, for apparatus for illuminating objects beneath the surface of water, or for giving light in mines and other places where combustible or explosive gases exist.—Dated November 24, 1856.

2796. JACOB LEVI ELKIN, of Jeffrey's-square, St. Mary Axe, for a process applicable to the manufacture of zinc.—Dated November 25, 1856.

2861. FREDERIC SIEMENS, of John-street, Adelphi, for arrangement of furnaces, applicable in all cases where great heat is required.—Dated December 2, 1856.

January 30, 1857.

1799. ROBERT WILLIAM SIEVIER, of Upper Holloway, for preserving wood from decay and also from destruction by insects.—Dated July 30, 1856.

1801. JULIAN DENIS, of Queenhithe, for a gelatinous and economical soap.—Dated July 30, 1856.

1816. THOMAS ROUTLEDGE, of Gracechurch-street, for the manufacture of half stuff and paper.—Dated July 31, 1856.

1827. OLIVER LONG, of Cornhill, for mechanical knife cleaners.—Dated August 2, 1856.

1836. GEORGE WALKER and JAMES SCRIMGEOUR, of Belfast, for spinning frames.—Dated August 4, 1856.

1838. ALEXANDER WRIGHT, of Millbank-street, for lighting mines and subterranean places with gas.—Dated August 4, 1856.

1846. JEAN JACQUES DANDURAN, of Charlotte-street, Fitzroy-square, for an apparatus called "the self-swimmer."—Dated August 5, 1856.—(A communication.)

1870. WILLIAM GORSE, of Birmingham, for a new or improved door fastener.—Dated August 8, 1856.

1876. THOMAS WHITTAKER, of Accrington, for a mode or method of washing or cleansing woven fabrics.—Dated August 9, 1856.

1900. ALFRED PRIEST and WILLIAM WOOLNOUGH, of Kingston-on-Thames, for horse hoes.—Dated August 14, 1856.

1970. ETIENNE STERLINGUE, of Paris, for preparing for tanning and in tanning hides and skins.—Dated August 23, 1856.

2012. John Randolph Sees, of New York, U. S. A., for heating the feed water of steam boilers.—Dated August 29, 1856.

2882. Auguste Edouard Loradoux Bellford, of Bedford-street, Strand, for drying, burning, and cooling bricks, tiles, and other ceramic substances.—Dated December 4, 1856.—(A communication.)

2884. David Crawford, of Glasgow, for washing, cleansing, and preparing textile fabrics and materials.—Dated December 4, 1856.

February 3, 1857.

1834. Nicolas Cadiat, of Paris, for the application of centrifugal force for purifying liquids.—Dated August 4, 1856.

1844. Antoine Dominique Sisco, of Paris, for railway brakes.—Dated August 5, 1856.

1848. John Keith, of Eltham, for machinery for making envelops.—Dated August 5, 1856.—(A communication.)

1864. Coleman Defries, of Houndsditch, for roof lamps of railway carriages.—Dated August 7, 1856.

1882. Edward Owen, of Blackheath, for the manufacture of gas, and in the obtainment of products arising in such manufacture.—Dated August 9, 1856.

1887. Richard Archibald Brooman, of Fleet-street, for a fermenting agent.—Dated August 11, 1856.—(A communication.)

1897. Jean Baptiste Clara, of Paris, and South-street, Finsbury, for producing and employing steam and the gaseous products of combustion for obtaining motive power.—Dated August 13, 1856.

1925. William Edward Newton, of Chancery-lane, for machinery for cutting and finishing metal screws.—Dated August 18, 1856.—(A communication.)

1927. William Edward Newton, of Chancery-lane, for machinery for forging or working iron and other metals.—Dated August 18, 1856.—(A communication.)

1939. Joseph Broüard and Joseph Hubert, of Paris, and South-street, Finsbury, for reefing the sails of ships or vessels.—Dated August 19, 1856.

1956. Robert Kenton, of Birmingham, for fishing reels.—Dated August 21, 1856.

2000. Alfred Vincent Newton, of Chancery-lane, for machinery for combing fibrous substances.—Dated August 27, 1856.

2366. George Hallen Cottam and Henry Richard Cottam, of Old St. Pancras-road, for iron hurdles.—Dated October 9, 1856.

2389. George William Varnell, of Camden-town, for mounting troughs, mangers, and apparatus, used for feeding horses and other animals.—Dated October 11, 1856.

2815. James Higgin, of Manchester, for treating certain vegetable dye stuffs or preparations therefrom, so as to obtain a colouring substance of increased purity.—Dated November 28, 1856.

2897. James Perry, of Ballymoney, for the treatment, application, and use of mineral tar for the production of oleaginous and lubricating matter and fuel.—Dated December 6, 1856.

2905. Richard Eaton, of Sussex-terrace, Battersea, for the manufacture of springs when india-rubber is used.—Dated December 8, 1856.

February 6, 1857.

1863. SAMUEL KING, of Brighton, for spirit lamps.—Dated August 7, 1856.

1869. THOMAS AUSTEN, of Waltham Abbey, for a machine for ascertaining the propelling force of gunpowder.—Dated August 8, 1856.

1878. JOHN DARLINGTON, of Cannon-street, for superheating steam.—Dated August 9, 1856.—(A communication.)

1883. GEORGE ANDERSON, of Dalston, for the construction of taps or valves for regulating the passage of gas.—Dated August 9, 1856.

1917. JOHN WEIR DRAPER BROWN, of London-bridge, and GEORGE GIBSON BROWN, of Deptford, for signal lanterns.—Dated August 16, 1856.

1929. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for stopping or retarding railway carriages and trains, and in preventing carriages running off the rails.—Dated August 18, 1856.—(A communication.)

1955. THOMAS YORK, of Wolverhampton, for a safety valve and low water indicator for steam boilers.—Dated August 21, 1856.

1962. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for cutting chenille.—Dated August 22, 1856.—(A communication.)

2005. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for shuttles.—Dated August 28, 1856.—(A communication.)

2006. BERNARD AUGUSTUS GRAUTOFF and CHARLES HENRY WILLIAM ALBRECHT, both of Lime-street-square, for pressure and vacuum gauges.—Dated August 28, 1856.—(A communication.)

2007. THOMAS WATSON, of Poland-street, for a beer-engine lever or lifter, and apparatus for fitting the same to counters.—Dated August 28, 1856.

2345. SIMON GHIDIGLIA and LOUIS TURLETTI, of Paris, and South-street, Finsbury, for an improved buckle.—Dated September 3, 1856.

2206. JOHN UNDERWOOD and FREDERIC VALENTINE BURT, of Fish-street-hill, for the manufacture of copying inks for printing.—Dated September 19, 1856.

2411. ARCHIBALD TURNER and LUKE TURNER, of Leicester, for the manufacture of elastic fabrics.—Dated October 15, 1856.

2467. GEORGE BLAIR, of Leicester, for looped fabrics.—Dated October 21, 1856.

2821. ARCHIBALD TURNER, of Leicester, for elastic fabrics.—Dated November 28, 1856.

2951. RAFAELLO LOUIS GIANDONATI, of St. Paul's Church-yard, for improvements in overshoes.—Dated December 12, 1856.

2957. HENRY PEASE, of Pierremont, and THOMAS RICHARDSON, of Newcastle-on-Tyne, for the manufacture of compounds of alumina.—Dated December 12, 1856.

2981. JOHN STOBO, of Leven Bank Works, for improvements in forcing or lifting corrosive or chemical liquids.—Dated December 16, 1856.

3027. DANIEL WEST, of Egremont-place, New-road, for presses constructed to operate by a combination of iron levers, which presses are employed to compress bales of cotton, hemp, wool, and other articles of merchandise.—Dated December 2, 1856.

February 10, 1857.

1888. NICHOLAS DORAN MAILLARD, of Dublin, for a mechanical and magnetic compass.—Dated August 12, 1856.

1894. DAVID LESSER, of Manchester, for machinery or apparatus for making "lozenges" or other similar articles.—Dated August 13, 1856.

1895. RICHARD DUGDALE KAY, of Accrington, for machinery or apparatus for washing, scouring, cleaning, preparing, dyeing, or finishing woven fabrics, yarns, or threads.—Dated August 13, 1856.

1901. JOHN KNOWLES, of Holcombe Brook, and WILLIAM CLARKE, of Manchester, for looms for weaving.—Dated August 14, 1856.

1924. WILLIAM TYTHERLEIGH, of Birmingham, for rollers or cylinders for printing fabrics.—Dated August 18, 1856.

1934. PIERRE NOYER, of Gerrard-street, Soho, for winding up fusee watches and pocket chronometers, and setting the hands without key.—Dated August 19, 1856.

1953. WILLIAM AKROYD and JOHN THOMPSON, of Halifax, for carpets or other fabrics.—Dated August 21, 1856.

2016. JAMES BLAKE and FRANCIS MAXWELL, of Liverpool, for the manufacture of soap.—Dated August 30, 1856.

2038. PIERRE JOSEPH GUYEL, of Paris, for stopping or retarding railway carriages and trains, and of warming the interior thereof.—Dated September 2, 1856.

2094. THOMAS RESTELL, of New Kent-road, for breech-loading fire-arms and ordnance.—Dated September 8, 1856.

2345. WILLIAM WILKINSON, of Nottingham, for ornamenting glass, and in the preparation of the materials employed therein.—Dated October 7, 1856.

2358. DAVID JOY and WILLIAM HOLT, of Leeds, for hydraulic motive power-engines, and the application thereof to certain useful purposes.—Dated October 8, 1856.

2585. HENRY BESSEMER, of New Cannon-street, for the manufacture of rails or railway bars and axles.—Dated November 4, 1856.

2726. HENRY BESSEMER, of New Cannon-street, for the manufacture of iron.—Dated November 18, 1856.

2813. ROBERT GRIFFITHS, of Mornington-road, Regent's-park, for vessels and engines for propelling vessels.—Dated November 28, 1856.

2828. LABAN CLARKE STUART, of New York, U. S. A., for machinery for reducing fibres to pulp.—Dated November 29, 1856.—(A communication.)

2877. LABAN CLARKE STUART, of New York, U. S. A., for drying sized paper.—Dated December 4, 1856.—(A communication.)

2908. JAMES BLAIN, of Belfast, for Jacquard apparatus for weaving.—Dated December 8, 1856.

February 13, 1857.

1905. PETER AUGUSTIN GODEFROY, of New North-road, Islington, for treatment of the matrix of rock quartz and all like substances, for the extraction of auriferous, argentiferous, and other metals contained therein.—Dated August 14, 1856.

1908. HENRY COLUMBUS HURRY, of Wolverhampton, for railway crossings.—Dated August 15, 1856.

1914. William Hargreaves, of Bradford, for improvements in Collier's combing machine in combing wool, hair, cotton, silk, flax, and other fibrous substances.—Dated August 16, 1856.

1916. David Chalmers, of Manchester, for looms for weaving.—Dated August 16, 1856.

1919. Samuel Lilley, of Birmingham, for the manufacture of ships' iron work, a part of which improvements is applicable to the manufacture of other articles in iron.—Dated August 16, 1856.

2009. Jean Baptiste Feauveau and Louis Alexander Legrand, of Brussels, for an apparatus for the purification and the combustion of gas.—Dated August 28, 1856.

2013. John Brown, of Pendleton, for swinging hammocks and in the construction of bedsteads or couches, and in the apparatus connected therewith.—Dated August 29, 1856.

2020. Charles Goodyear, of Leicester-square, for combining gutta percha and asphalt or pitch.—Dated August 30, 1856.

2049. James Picken, of Dunlop, for the arrangement of the feed apparatus of machines for thrashing or separating grain.—Dated September 4, 1856.

2145. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for fire-arms.—Dated September 13, 1856.—(A communication.)

2157. George Cranstoun Trotter Cranstoun, of Chirnside-bridge, George Young, of Dunse, and John Lovell, of Chirnside-bridge, for the application of steam for producing a boiling action in bleaching and other manufacturing processes.—Dated September 15, 1856.

2191. Thomas Greenwood, of Leeds, for machinery for trimming the teeth of wheels.—Dated September 18, 1856.

2230. Alfred Vincent Newton, of Chancery-lane, for gimlets, augers, and other tools which operate by a rotary motion.—Dated September 23, 1856.—(A communication.)

2231. William Johnson, of Lincoln's-inn-fields, and of Glasgow, for machinery for doubling and twisting fibrous materials.—Dated September 23, 1856.—(A communication.)

2386. George Heppell, of Uttoxeter, for ventilating mines and other like places.—Dated October 11, 1856.

2656. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for projectiles.—Dated November 11, 1856.—(A communication.)

2959. William Beevers Birkby, of Cleckheaton, for the manufacture of pointed wire fillets used in the preparation of flax, tow, hemp, and other fibrous substances.—Dated December 12, 1856.

2969. Archibald Turner, of Leicester, for the manufacture of elastic fabrics.—Dated December 13, 1856.

2989. William Edward Newton, of Chancery-lane, for the manufacture of table knives.—Dated December 17, 1856.—(A communication.)

February 17, 1857.

1933. Henry Forfar Osman, of Essex-street, Strand, for an electric clock.—Dated August 19, 1856.—(A communication.)

1951. Joseph Hacking, Cotton Manufacturer, and William

WHEELER, of Clitheroe, for improvements in the mode or method of winding, warping, sizing, and beaming cotton, woollen, linen, or other yarns or threads, and in the machinery or apparatus employed therein.—Dated August 21, 1856.

2062. BENJAMIN O'NEALE STRATFORD, Earl of Aldborough, of Stratford Lodge, for improvements in aërial navigation and in the apparatus connected therewith, parts of which are applicable to locomotion generally.—Dated September 4, 1856.

2063. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for the construction of buildings and parts of buildings.—Dated September 4, 1856.—(A communication.)

2089. JOHN FOWLER, junior, of Havering, for machinery or apparatus for ploughing and tilling land by steam.—Dated September 8, 1856.

2317. WILLIAM JOHNSON, of Lincoln's-inn-fields, and of Glasgow, for the treatment, preparation, or manufacture of sheet caoutchouc, and in the combination thereof with cloth and other fabrics.—Dated October 3, 1856.—(A communication.)

2645. JAMES SOMERVILLE, of Glasgow, for weaving.—Dated November 10, 1856.

2759. FREDERIC LUDEWIG, of Paris, for an improved leaven.——Dated November 21, 1856.

2841. EDWARD JACKSON EMMONS, of Massachusetts, U. S. A., for a new or improved nursery chair.—Dated December 1, 1856.—(A communication.)

2878. EBENEZER DAGGETT DRAPER and GEORGE DRAPER, of Massachusetts, U. S. A., for oil feeders, vessels, or cans, for oiling machinery.—Dated December 4, 1856.—(Partly a communication.)

2919. JOHN ROBINSON SCARTLIFF, of Wolverhampton, for apparatus to be employed as an alarm and detector in cases of burglary. —Dated December 9, 1856.

3000. JOSEPH BOWER, of Hunslet, near Leeds, for treating animal matters, in preparing them to be used for the manufacture of manure. —Dated December 18, 1856.

February 20, 1857.

1959. THOMAS JOHN CHIPP and RICHARD BITMEAD, of Soho, for apparatus for drilling and boring.—Dated August 22, 1856.

1966. EDWARD HALLEN, of Lambeth, for washing wool.—Dated August 23, 1856.

1969. WILLIAM RACSTER, of Woolwich, for apparatus for regulating the supply of gas.—Dated August 23, 1856.

1971. ALEXANDER MOSES, of Cannon-street-road East, for machinery for propelling vessels on water.—Dated August 23, 1856.

1983. JOHN PERRY, of Great Portland-street, for improvements in photography.—Dated August 26, 1856.

1984. WILLIAM HENRY PERKIN, of King David Fort, Saint George-in-the-East, for a new colouring matter for dyeing with a lilac or purple colour stuffs of silk, cotton, wool, or other materials.—Dated August 26, 1856.

1990. EDMUND SIMPSON, of Preston, for an improved safety cage for mines and pits, or apparatus to be fitted to cages, to prevent accidents from the falling thereof.—Dated August 26, 1856.

1992. Alfred Vincent Newton, of Chancery-lane, for an improvement in breech-loading cannons and other ordnance.—Dated August 26, 1856.—(A communication.)

1999. Alfred Vincent Newton, of Chancery-lane, for projectiles for cannon.—Dated August 27, 1856.—(A communication.)

2003. Charles Durand Gardissal, of Bedford-street, Strand, and Paris, for a mode of treating and preparing sea weeds or marine plants for manure.—Dated August 28, 1856.—(A communication.)

2014. John Fletcher and William Fletcher, of Salford, for the construction of weighing cranes or other similar elevating machines.—Dated August 30, 1856.

2024. Manoah Bower, Richard Peyton, and Joses Weaver Downing, of Birmingham, for metallic bedsteads, cots, couches, and other such like articles.—Dated August 30, 1856.

2026. Matthias Edward Bowra, of Basinghall-street, for the laying or placing of rails or chairs for railway and other purposes in the shape of beds or springs, or elastic sleepers.—Dated September 1, 1856.

2037. James Apperly, of Dudbridge, for preparing cotton, wool, flax, and other fibrous substances for spinning, and in carding and preparing machinery.—Dated September 2, 1856.

2048. Jules Mozard, of Dufour-place, Golden-square, for the construction of miners' lamps.—Dated September 3, 1856.

2057. William Keates, of Liverpool, for a process of reducing copper to the metallic state from ores and other materials containing copper, and in the furnaces employed therein.—Dated September 4, 1856.

2058. George Anderson, of Dalston, for improvements in the combustion of tar and other similar matters in heating gas retorts, and in the consumption of smoke arising therefrom and from other fuels used therewith.—Dated September 4, 1856.

2060. William Moberly, of Ravenhead, for grinding and polishing of curved and rounded surfaces.—Dated September 4, 1856.—(Partly a communication.)

2065. Henry Edward Cradock Monckton, of Regent-street, and William Clark, of Islington, for machinery or apparatus for tilling or cultivating the soil.—Dated September 5, 1856.

2068. William Smith Mitchell, of Cornhill, and Charles Martin Ernest Gartner, of Lower Ashby-street, for the construction of watches.—Dated September 5, 1856.

2081. Charles Louis Lapito, of Paris, and High-street, Marylebone, for a machine for manufacturing of mortar and concrete.—Dated September 6, 1856.

2101. Richard Archibald Brooman, of Fleet-street, for an apparatus for sprinkling substances in a state of powder.—Dated September 9, 1856.—(A communication.)

2144. Richard Peyton, of Birmingham, for the manufacture of metallic bedsteads and other articles for sitting, lying, and reclining upon.—Dated September 13, 1856.

2373. Jean Alexander Labat, jun., of Bordeaux, and of Essex-street, Strand, for closing or stoppering bottles, jars, and other like vessels.—Dated October 10, 1856.

2558. Benjamin Goodfellow, of Hyde, for the construction of steam boilers, and in the mode of supporting steam boilers on their seatings.—Dated October 31, 1856.

2906. JOHN ASTON and JOHN BRANT, of Birmingham, for the manufacture of covered buttons and covered ornaments.—Dated December 8, 1856.

3022. WILLIAM MILL, of Birmingham, for improvements in joining bands, in connecting fastenings to bands, and in attaching bands to articles requiring the same.—Dated December 22, 1856.

3030. JAMES REDGATE, EDWIN ELLIS, and JOHN CROPPER, of Nottingham, for bobbin net or twist lace machinery.—Dated December 22, 1856.

February 24, 1857.

1982. GEORGE WARRINER, of Withernsea, for compounds for preserving, deodorizing, and fertilizing.—Dated August 25, 1856.

1985. WILLIAM FREDERICK BUSH and WILLIAM HEWITT, of Bristol, for machinery or apparatus for grinding grain.—Dated August 26, 1856.

2004. CHARLES DURAND GARDISSAL, of Bedford-street, Strand, and Paris, for artificial fuel.—Dated August 28, 1856.—(A communication.)

2040. JOSEPH LAMB, of Manchester, for machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous substances.—Dated September 3, 1856.

2052. CONSTANT JOUFFROY DUMERY, of Paris, for steam engines. —Dated September 4, 1856.

2080. ALFRED VINCENT NEWTON, of Chancery-lane, for machinery for cutting round files.—Dated September 6, 1856. —(A communication.)

2186. LOUIS JACQUEMIER, of Charlotte-street, Fitzroy-square, for a method of hardening and colouring alabaster and other gypsums and calcareous stones and earths.—Dated September 18, 1856.—(A communication.)

2236. ALFRED VINCENT NEWTON, of Chancery-lane, for carding engines.—Dated September 24, 1856.—(A communication.)

2414. GEORGE COLLIER, of Halifax, for piled fabrics.—Dated October 16, 1856.

2446. JACQUES FELIX DESHAYES, of Paris, for machinery for dyeing silk, cotton, or wool in hanks, or skeins, or woven fabrics.—Dated October 18, 1856.

2890. LODEWYK POLAK KERDYK, of Manchester, for machinery or apparatus for extracting colouring matters to be employed for the purposes of dyeing, or for other similar processes.—Dated December 5, 1856.

3060. CHARLES SYLVESTER ROSTAING, of Dresden, for preparing and combining metallic substances for the production of colours, and in manufacturing the same.—Dated December 26, 1856.

47. LOUIS ANTOINE RITTERBANDT, of Warwick-street, Regent-street, for the treatment of substances containing earthy phosphates. —Dated January 6, 1857.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(*To the* 18*th February*, 1857, *inclusive*.)

162. JOHN LOCKHART, jun., of Paisley, for the manufacture of bobbins.—Dated January 23, 1854.

190. Archibald Lockhart Reid, of Glasgow, for printing textile fabrics and other surfaces.—Dated January 25, 1854.

193. Thomas Wicksteed, of Leicester, for the manufacture of sewage manure.—Dated January 26, 1854.

194. Thomas Wicksteed, of Leicester, for the manufacture of sewage manure, and in apparatus for that purpose.—Dated January 26, 1854.

243. Richard Archibald Brooman, of Fleet-street, for the manufacture of steel.—Dated January 31, 1854.—(A communication.)

234. Luther Young, of Bow-lane, and Edwin Martin, of Louisa-street, Stepney, for apparatus for regulating the pressure and supply of gas.—Dated January 31, 1854.

201. Patrick Moir Crane, of Canonbury Villas, Islington, for the manufacture of iron.—Dated January 27, 1854.

238. Louis Christian Koeffler, of Rochdale, for machinery or apparatus for preparing, dressing, and finishing yarns or threads.—Dated January 31, 1854.

241. Pierre Joseph Meeus, of Paris, for producing metallic surfaces.—Dated January 31, 1854.

246. Claude Bernard Adrien Chenot, of Paris, and of Castle-street, Holborn, for accumulating, conducting, and treating gases of combustion, and also in generating and applying the same to metallurgic and other purposes.—Dated February 1, 1854.

227. John Kershaw, of Dublin, for steam-engines.—Dated January 30, 1854.

240. William Wright and George Brown, of Newcastle-upon-Tyne, for cupolas, also applicable to smelting and other furnaces.—Dated January 31, 1854.

261. Adolphe Mohler, of Obernay, for apparatus for lubricating machinery.—Dated February 2, 1854.

264. James Stevens, of Southwark-bridge-road, for giving railway signals.—Dated February 2, 1854.

273. William Longmaid and John Longmaid, of Beaumont-square, for vegetable charcoal.—Dated February 3, 1854.

259. Joseph Beattie, of South Lambeth, for furnaces, and in the treatment of steam.—Dated February 1, 1854.

279. James Boydell, of Smethwick, for an improvement in the beds of reverberatory furnaces used for puddling iron.—Dated February 4, 1854.

328. Henry Warner, Joseph Haywood, and William Cross, of Loughborough, for knitting machinery.—Dated February 10, 1854.

277. George Mills, of Glasgow, for the construction of steam vessels and in steering the same.—Dated February 4, 1854.

302. James Taylor and Isaac Brown, of Carlisle, and John Brown, of Oxford-street, for charring vegetable and animal substances.—Dated February 7, 1854.

287. Auguste Louis Nicolas Comte Vander Meere, of Paris, for the manufacture of artificial whalebone, or a substance capable of being employed as a substitute for whalebone and tortoiseshell.—Dated February 6, 1854.—(A communication.)

300. Alphonse François Damiens Duvillier, of Paris, and of Castle-street, Holborn, for remontoirs, or apparatus for winding up watches without a key.—Dated January 7, 1854.

320. David Brown, of Smethwick, and John Brown, of West

Bromwich, for the construction and manufacture of axles for railway and other carriages.—Dated February 10, 1854.

332. WILLIAM WHITELEY, of Lockwood, for machinery or apparatus for tentering or stretching woollen and other fabrics.—Dated February 10, 1854.

347. JAMES COX, of Wenlock-road, City-road, for knives for cutting paper and other materials.—Dated February 13, 1854.

369. GEORGE FERGUSSON WILSON, of Vauxhall, for improvements in preparing an oil, and in the manufacture of candles and night lights.—Dated February 15, 1854.

377. GEORGE FERGUSSON WILSON, of Vauxhall, for the manufacture of lubricating matters.—Dated February 16, 1854.

297. HENRY OLDING, of Lambeth, for stoves and fireplaces.—Dated February 7, 1854.

326. JAMES YOUNG, of Glasgow, for improvements in gas-making.—Dated February 10, 1854.

428. EDWARD MASSEY, of Tysoe-street, Clerkenwell, for ships' logs, known as "Massey's patent ships' logs."—Dated February 22, 1854.

351. JOHN BURT SMITH and EDWARD SMITH, of Regent-street, for bonnets.—Dated February 13, 1854.

361. PATRICK O'CONNOR, of Wavertree, for a lever hinge for suspending and closing doors and gates.—Dated February 14, 1854.

368. JOHN WREN, of Tottenham-court-road, for a folding chair bedstead.—Dated February 15, 1854.

375. JOHN DAVIE MORRIES STIRLING, of the Larches, Camphill, Birmingham, for the manufacture of steel.—Dated February 16, 1854.

378. THOMAS FAWCETT, of Lisburn, for weaving linen or other fabrics to produce plaits or folds therein.—Dated February 17, 1854.

388. MOSES POOLE, of Avenue-road, Regent's-park, for boiler furnaces and other furnaces.—Dated February 17, 1854.—(A communication.)

393. EDWARD LOYSEL, of Paris, for apparatus for obtaining infusions or extracts from various substances.—Dated February 18, 1854.

424. WILLIAM EDWARD NEWTON, of Chancery-lane, for fire-arms and projectiles.—Dated February 22, 1854.—(A communication.)

429. SAMUEL COLT, of Spring Gardens, for machinery for rifling fire-arms.—Dated February 22, 1854.—(Partly a communication.)

452. EDWARD HAMMOND BENTALL, of Heybridge, for ploughs or implements for cultivating land.—Dated February 24, 1854.

455. AUGUSTE EDOUARD LORADOUX BELLFORD, of Castle-street, Holborn, for machinery for dressing stone.—Dated February 24, 1854.—(A communication.)

394. BASHLEY BRITTEN, of Anerley, for crushing, pulverizing, and washing mineral earths or ores, and amalgamating the gold and silver contained therein, which said improvements are also applicable to crushing and pulverizing other substances.—Dated February 18, 1854.

416. ERNEST GESSNER, of Aue, Saxony, for gigmills.—Dated February 21, 1854.

431. JAMES BOYDELL, of Gloucester-crescent, Regent's-park, for applying apparatus to carriages to facilitate the draught.—Dated February 22, 1854.

403. HARVEY HILLIARD, of Glasgow, for apparatus for cleaning and sharpening table cutlery.—Dated February 20, 1854.

405. WILLIAM MILNER, of Liverpool, for locks for safes, which are applicable to locks in general.—Dated February 20, 1854.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 4. Vol. XXIX. ENLARGED SERIES.—APRIL, 1857.

Specification of the Patent granted to John Jobson, *of Litchurch Works, near Derby, in the County of Derby, Iron Founder, and* Robert Jobson, *of Holly Hall Works, near Dudley, in the County of Stafford, Iron Founder, for Improvements in the Manufacture of Moulds for Casting Metals.*—Dated February 1, 1854.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—We prepare a pattern of the article to be cast, which pattern may be of iron, wood, or other suitable material. Thus, if it be required to prepare moulds for the casting of a plate of the sectional form shown in fig. 1, we prepare a pattern of the same, and we make two moulds from the same of sand or plaster of Paris, or other suitable material, which will present the forms shown in figs. 2 and 3. We then place an empty moulding box on the mould, fig. 2, and we pour in an alloy of lead and tin, or zinc and tin, or other suitable metal or alloy of metals, until the mould is covered thereby. When the plate deviates considerably from a flat surface, a core or cores

of sand or other suitable material may be introduced at parts, so as to displace a portion of the fluid metal and render a less quantity of the same sufficient to cover the mould. Pins or screws or other projecting pieces attached or not to the moulding box, as may be most convenient, are introduced into the metal, and when it has solidified, the box is filled with Roman cement or other suitable material, so as to form a ramming block with a metallic face or surface, fig. 4, or the blocks may be made entirely of metal or alloys of metal. Another ramming block, fig. 5, is made in a similar manner from the mould, fig. 3. A moulding box is placed on each of these ramming blocks, and sand or loam is rammed in, and the two sand moulds thus made are placed together as in fig. 6, to form the complete mould for receiving the melted iron or other metal, suitable passages being left in the sand for the purpose. The frames or boxes are provided with pins and holes which fit corresponding holes and pins in each other, and in the ramming blocks.

Instead of introducing cores to displace a portion of the metal as above mentioned, we sometimes proceed in the following manner:—We prepare an additional pair of moulds, of sand or other suitable material, figs. 7 and 8, from the original pattern, and we scrape away a portion of the sand as shown by the lines, *a*, *a*, and *b*, *b*. We then place these moulds in contact respectively with the moulds, figs. 3 and 2, as shown in figs. 9 and 10, and pour the alloy of lead and tin, or other metal or alloy of metal, into the same, through suitable passages made in the sand or other material for that purpose. The plates thus made are backed with Roman cement or other suitable material after taking out the sand, but before the boxes have been separated or the plate displaced, forming the ramming blocks shown in figs. 11 and 12, which are employed in a similar manner to those shown in figs. 4 and 5.

It will be seen that the partings of the sand, or the surfaces of the sand which come in contact with each other in the complete mould, fig. 6, as well as the mould of the article itself, are thus moulded on metallic surfaces. The moulds are thus made with great accuracy, and also with great facility, as the moulder's skill is not required to produce a good parting.

In lieu of pouring melted metal into the mould to form the face of the ramming block, we sometimes fix an empty

box upon the mould, fig. 2 or 3, (which for this purpose may be of plaster of Paris,) and we lute this box on in a water-tight manner, and fill it with a solution of sulphate of copper or other suitable metallic solution, and we cause the copper or other metal or mixture of metals to be deposited on the surface of the mould by means of the electrotype process. The mould is previously prepared with wax or other suitable material to prevent it from absorbing or being acted upon by the metallic solution, and it is rendered capable of conducting electricity by means of black lead or other suitable conducting material, as is well understood. When a sufficient coating of copper or other metal has been thus deposited, the solution is removed, and the plate backed if necessary with lead and tin or other suitable metal or alloy of metals, and the box filled up with Roman cement or other suitable material. Screws or pins or pieces of metal are placed on the surface while the metal is depositing, and these pieces of metal become attached to the deposit and serve to connect it firmly to the Roman cement or other backing. The ramming blocks thus made are similar to those shown in figs. 4 and 5, and are employed for forming the sand moulds in a similar manner.

If a box of iron or other material capable of being injuriously acted upon by the sulphate of copper, or other metallic solution, is employed, it is to be coated with grease on the inside, or otherwise protected from the action of the solution. A wooden box lined with pitch or with gutta percha may be employed while the metal is being deposited, and this box may be removed and replaced by an iron box when the deposit has acquired a sufficient thickness, and the iron box is then filled up with the backing as hereinbefore described.

We also prepare ramming blocks consisting of lead and tin or other metals, or partly of metal and partly of Roman cement or other suitable backing, and having the original pattern attached to one of such ramming blocks, in a similar manner to that described in the specification of letters patent granted to me, the said John Jobson, on the 2d day of October, 1852. In this mode of proceeding, the two moulds, figs. 2 and 3, are first made from an iron or metal pattern, fig. 1. This pattern is then laid on the mould, fig. 2, after attaching some hooks to its back, and an empty box is placed over it, and an alloy of lead and tin,

or zinc and tin, or other suitable metal or alloy of metals, is poured into the box so as to cover the pattern. Hooks or pins are placed in the liquid metal, and when it has cooled, the box is filled with Roman cement or other suitable backing. The ramming block, fig. 13, is thus produced. Or the box may be completely filled with the melted metal if preferred. The other ramming block is made as hereinbefore described, or it may be made as described in the specification of the former letters patent hereinbefore mentioned, by making a reverse mould in plaster or sand, from the mould, fig. 3, and again taking a cast from this reverse mould in Roman cement or other similar material, which will then produce a ramming block of the form shown in fig. 3.

Having now described the nature of the said invention, and in what manner the same is to be performed, we wish it to be understood that we do not claim generally the application in the manufacture of moulds for casting metals of lead and tin, or zinc and tin, or other metal or alloy of metals.

But what we claim is,

The manufacture of moulds for casting metals by means of ramming blocks, constructed in manner hereinbefore described, either entirely of metal or with metallic surfaces firmly attached to a backing of Roman cement or other suitable material, which metallic blocks or surfaces serve for moulding the partings of the sand or other material forming the mould, as well as for moulding the form of the article itself.—In witness, &c.

JOHN JOBSON.
ROBERT JOBSON.

Specification of the Patent granted to GEORGE JOSIAH MACKELCAN, *of Islington, in the County of Middlesex, Engineer, for Improvements in the Manufacture of Rollers adapted to Calico and other Printing.*—Dated June 3, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My said invention refers to the construction and manufacture of compound rollers for printing calico and other

fabrics, and for other purposes, in which a shell or tube of copper or other metal, brass or other metallic alloy, adapted to be engraved or embossed, is fixed on a simple metallic cylinder by the intervention of tin, zinc, solder, or other uniting medium which, together with the contraction of the shell, shall produce adhesion and cohesion of the surfaces.

Now, for the better understanding of my said improvements in respect to their nature, and for the more effectually carrying the same into operation, I will proceed to describe several details thereof, reference being had to the drawings hereunto annexed, which are made to a scale of three inches to the foot, of a roller three feet long by five inches diameter, when finished.

Fig. 1, is a longitudinal section of my compound roller.

Fig. 2, is a cross section of the same. A, is the metallic cylinder or body of the roller, adapted to the compion mandril or other spindle, on which is fixed the shell, B; C, C, is the line of adhering surfaces of the shell and body of the roller, and represents also the solder or medium employed to effect the union when used. The shell, B, is affixed to the cyliuder, A, by any of the following modes:—

First, a metallic cylinder is prepared, of cast iron or other metal, its surface being either plain or grooved in any direction, or roughed in any manner, and coated with tin, zinc, solder, or other uniting medium on its exterior surface. A shell or tube of copper or other metal or metallic alloy is also prepared, of such a diameter that when cold it is too small to go over or admit the cylinder; its interior surface is made chemically clean, and is then heated in an oven or retort adapted for the purpose to such a temperature at least as shall dilate it sufficiently to admit the prepared cylinder, which is also heated. It is preferred that the shell should be ready to receive the cylinder immediately on its withdrawal from the tinning or coating bath. It is also necessary that the diameters of the interior of the shell and the exterior of the cylinder bear such proportions to each other, that, when the shell is lowered to the same temperature as the melting point of the uniting medium, it shall bind upon it and the cylinder. The shell and the cylinder will then be united together, both by the cohesion and adhesion of the interposed mediums, and by the contraction of the cooling shell, which is allowed, by preference, to take place gradually.

Secondly, a cylinder is prepared as before, as also a shell; but in this instance the shell is internally coated with the uniting medium, as well as the cylinder externally; the shell is then dilated as before by heat to about the melting point of the coating, when the cylinder, either cold or but slightly heated, is inserted in the shell, and they are allowed to remain in the oven or retort until the compound mass is raised to the melting point of the uniting medium; when cool they will be united, as before, both by the cohesion of the surfaces and by the grip of the contracted shell.

Thirdly, a cylinder and shell are prepared as before, and the shell, coated or not, may be greater in diameter internally than the exterior of the cylinder, or smaller, or of the same size. The cylinder may be inserted while the shell is cold, or when dilated by heat. The lower end being stopped, they are there raised in the retort to the temperature of the melting point of the uniting mediums, when it is poured between the two in a fluid state, and the whole allowed to cool, as in the former cases. Here will be again cohesion and adhesion, arising from the presence of the uniting medium, as also from the superior contraction of the shell.

Fourthly, a cylinder and shell are prepared as in the first case, but without either being coated. The shell is again dilated in the retort, and the cylinder inserted cold, and, by preference, the shell is allowed to cool rapidly, when it will obtain firm hold upon the cylinder by its contraction.

The subsequent operation of finishing, in all these cases, may be performed in the usual way.

As the shell wears out or becomes useless, it may be removed by heating the whole mass to the melting point of the uniting point of the uniting medium. The cylinder when withdrawn will be available for another shell at a trifling cost. It will thus be seen that my improved compound roller is formed of a simple metallic cylinder of any desirable dimensions, covered with a shell of copper or other metal, brass or other metallic alloy, affixed to it by means of a uniting medium, or solder alone, or by the uniting medium and the contraction of the shell, or by the contraction of the shell alone.

Having thus described the nature of my invention, and several modes of bringing it into effect, I wish it clearly to be understood that I do not confine myself to the precise

details herein described, nor to any particular mode of preparing the cylinder or shell, nor to any precise mode of performing the various operations described, so long as the peculiar features of my invention are maintained; and I do declare that what I claim is,—

First, the peculiar construction of my compound roller, in which a metallic shell is made coherent to a metallic cylinder by means of an interposed medium, as described.

Second, the peculiar construction of my compound roller, in which a metallic shell is made to hold upon the metallic cylinder by its own contraction, as described.—In witness, &c.

GEORGE JOSIAH MACKELCAN.

Specification of the Patent granted to JEREMIAH BROWN, *of Kingswinford, in the County of Stafford, Machinist, for New or Improved Machinery to be used in the Manufacture of Iron.*—Dated May 19, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.— My invention consists of the machinery hereinafter particularly described and illustrated in the accompanying drawing, for rolling, squeezing, or compressing iron, at that stage of the manufacture of the said iron at which the said iron, having been puddled, is subjected to compression, previous to being rolled into bars or made into other forms.

Fig. 1, represents in vertical section, and,

Fig. 2, in front elevation, one of the machines constructed according to my invention; *a*, *b*, are rolls situated over one another; *c*, *d*, are small rolls situated in a horizontal plane. The rolls, *a*, *b*, are not cylindrical, but have a transverse section, the figure of an involute curve; the radius of the curved surface passing uniformly from a minimum to a maximum. The rolls, *a*, *b*, rotate in the same direction, their opposed faces moving consequently in opposite directions, and anything placed between the rolls, *a*, *b*, is subjected to a rolling and compressing action; the side rolls, *c*, *d*, prevent the mass of iron, *e*, from falling from its place. The ball of iron is introduced between the

rolls, *a*, *b*, when those portions of the rolls of shortest radius are opposed to one another, the ball being introduced at the point marked, *f*. A cavity may be cut in the upper roll, *a*, at its smallest diameter, for the purpose of more readily permitting of the introduction of the mass of iron. The surfaces of the rolls, *a*, *b*, are furnished with a series of teeth, as represented, so as to give them a better hold of the ball of iron. The mass of iron introduced at *f*, is, by the rotation of the rolls, *a*, *b*, compressed and rolled into a cylindrical form, without any lapping or doubling of one portion of the iron upon another. The side rolls, *c*, *d*, are made to slide horizontally, so as to follow the ball of iron, *e*, as its diameter diminishes. This sliding is effected by the collars, *l*, *m*, of the rolls, *c*, *d*, sliding in the slots, *g*, *h*; cambs, *i*, *k*, by their rotation, forcing the journals, *l*, *m*, towards each other, as the size of the ball, *e*, diminishes. The rotation of the cambs, *i*, *k*, is produced by the axes of the said cambs being geared in any convenient manner to the axes of the rolls, *a*, *b*. During the time that the ball, *e*, is being compressed by the rolls, *a*, *b*, I subject the said ball to compression in the direction of its axis, or as it is technically called, I "upset" the ball by means of compressing or percussive machinery, acting on one or both ends of the ball. The nature of this "upsetting" machinery will be understood by reference to fig. 2; *n*, is a ram or plunger sliding horizontally upon the rollers, *o*, *o*, the said ram, *n*, passing through a hole in the framing of the machine, and striking the ball, *e*, on its end. The ram, *n*, may be actuated by a horizontal shaft having a crank, to which the said ram is jointed by a link or connecting rod, as shown in fig. 4. The rollers, *o*, *o*, may also be put in motion, so as to assist the motion of the ram, *n*, or instead of the rollers, *o*, *o*, two pinions may be employed, engaging in a rack on the under side of the ram, *n*; or the ram, *n*, may be actuated by a quick threaded screw being made to give to it an alternating motion. The working of the ram, *n*, is independent of the working of the rolls, *a*, *b*, so that the upsetting action of the said ram may be continued while the rotation of the rolls, *a*, *b*, is stopped. When the upsetting is effected on one side only, then one of the rolls, *a*, *b*, is provided with a flange similar to that hereinafter described, and represented at *q*, fig. 5. I sometimes place a ram on either side of the machine, as represented in fig. 4, in which case the rolls are without a flange, and

the pinion, *r*, by which motion is communicated to the rolls is hollow, so that the second ram, n^1, may act through it. Instead of "upsetting" the ball of iron by means of percussive or compressing machinery separate from the rolls, *a*, *b*, I sometimes effect the same object by means of flanges on the rolls themselves, the said flanges not being parallel, but having an undulating or zig-zag figure on their faces, the projecting part of one face being opposed to the depressed part of the face of the other flange; I prefer to make the undulating surfaces of the flanges of the rolls by inserting pieces of steel on those parts of the flanges which project. The ball, when acted upon by the said rolls, is compressed laterally by the said flanges. The bearings of the said rolls, *a*, *b*, figs. 1 and 2, may be provided with springs, so as to permit of a small amount of yielding in the said rolls. I do not limit myself to any particular method of applying the said springs, but I prefer to apply them in the following manner:—I place on the tops of the screws, *p*, *p*, pinions, with which a toothed wheel between them engages. On the said toothed wheel an arm or lever is placed, and I apply the spring to the said arm or lever. The screws, *p*, *p*, have four or more threads, so as to be quick acting, and capable of yielding when the resistance of the iron between the rolls is greater than the pressure of the springs.

Fig. 3, represents in section, and

Fig. 4, in elevation, a modification of the machine, figs. 1 and 2. In this modification, the rolls, a^1, b^1, are not placed over one another, but in an inclined position, as represented. By this modification, only one side roll, c^1, is required to prevent the ball, *e*, from falling from between the roll, a^1, b^1. *n*, n^1, are the rams by which the "upsetting" is effected, which rams may be actuated by cranks and connecting links, one of the said cranks, *s*, and connecting link, *t*, being represented in fig. 4.

My invention consists further of improvements in the machinery used in the manufacture of iron, for which letters patent were granted to me, bearing date July 3, 1847. The said improvements are illustrated in fig. 5, which represents in section a machine constructed according to this part of my invention. The said improvements consist in the use with the machine, fig. 5, of a ram, such as is represented in fig. 2, or of two rams, as represented

in fig. 4. There is a flange, *q*, on the lower roll, *u*, and in that part of the flange marked, q^1, I insert a piece of steel. The ball is "upset" between the ram and the flange, *q*, the principal action being against that part of the flange in which the steel is inserted. When I apply two rams with the machine, fig. 5, I make the bottom roll, *u*, without a flange, the "upsetting" of the ball of iron being effected between two rams, as in fig. 4. I sometimes make the ends of the rams of a triangular figure, as represented in fig. 6, so that they may more completely occupy the space between the rolls when the said rolls have approached each other closely. The end of the ram when used with any of the machines, may be made of steel, either forged on to the said ram, or inserted by screwing, or otherwise, therein. I apply to the machine last described, and represented in fig. 5, the four or quick threaded screws, for the purpose of pressing upon the bearings of the rolls hereinbefore described, and represented in figs. 1, 2, and 3, and I apply a spring to the said screws in the manner described, with reference to the said figs. 1 and 2. I make the large rolls of the several machines described hollow, so as to permit of the circulation of water through the said rolls, for the purpose of cooling them. The thickness of the hollow rolls is indicated in fig. 3. The ball, after it is delivered from either of the machines represented, is received upon an inclined plane, *v*, fig. 5, down which it passes on to a pair of rolls, *w*, *x*, fig. 5. These rolls have ribs or teeth on them, and revolve in the same directions, but at different speeds. By the action of these rolls the ball is cleaned from scoria, the ribs on the rolls scraping off the said scoria, which falls down between the said rolls. I also apply to the lower roll of the machine, fig. 5, the flanges, having undulating or ziz-zag faces, as hereinbefore described, for upsetting the ball in place of rams.

I wish it to be particularly understood that my improvements in the machine, fig. 5, formerly patented by me, consist in the application thereto of the four-threaded or quick screw, the single or double ram, the undulating or zig-zag flanges, and the two rolls, *w*, *x*, for cleansing the ball of scoria. When I wish to make a bloom of larger than the ordinary size, I join two or more balls together, by pressing them in a chamber or hopper, previous to putting them into the blooming machine, herein first described,

which in this case is of larger size than when an ordinary bloom is required. In converting balls of iron into slab moulds, I use a pair of rolls, the lower one having flanges between which the upper roll works; the said flanges being thicker in one part than in another, so that the distance between their opposed faces is greater at one point than at another. The ball is introduced between the rolls when the greatest width between the flanges is presented, and as the rolls rotate, the narrow part of the roll carries forward the ball, which is rolled out into a slab mould. The ball may be passed through the roll several times.

Having now described the nature of my said invention, and the manner of carrying the same into effect, I wish it to be understood that I do not limit myself to the precise details herein described and represented, as the same may be varied without departing from the nature of my said invention; but I claim as my invention,—

Firstly, the machines hereinbefore described and illustrated in figs. 1, 2, 3, and 4, of the accompanying drawing, to be used in the manufacture of iron; that is to say, machines in which a ball of iron is subjected to a squeezing and rolling action, between a pair of large rolls of varying radius, the ball being held between the said large rolls by one or two small side rolls, as herein described and represented.

Secondly, "upsetting" or compressing laterally the ball of iron while in the machines, figs. 1, 2, 3, 4, and 5, by the machinery described and represented, whether a single or double ram be employed.

Thirdly, the use of undulating or zig-zag flanges on the rolls, and the insertion of steel in flanges of rolls for compressing balls of iron, as hereinbefore described.

Fourthly, making the large rolls of machines, herein described and represented, hollow, for the circulation of water therethrough, as herein described, and illustrated in fig. 3 of the accompanying drawing.

Fifthly, the use of a screw having four or greater number of threads for the purpose of acting upon rolls for compressing iron, as herein described and illustrated in figs. 1, 2, 3, and 5, of the accompanying drawing.

Sixthly, the use of two rolls as herein described and represented in the accompanying drawing for cleansing the ball from scoria.

Seventhly, the making of slab moulds from balls of iron by the use of rolls having flanges of varying widths, as herein described.—In witness, &c.

JEREMIAH BROWN.

Specification of the Patent granted to FRANCIS ALTON CALVERT, *of the City of Manchester, Engineer, for Improvements in Machinery for Opening, Cleaning, and Carding Cotton, and other Fibrous Materials.*—Dated May 31, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The nature of my said invention consists,—

First, in the application of one or more revolving drums furnished with combs for opening and cleaning cotton and other fibrous materials.

Secondly, the application of a drum or drums with combs, in combination with a toothed cylinder, and other parts requisite to complete a machine for opening and cleaning cotton and other fibrous materials.

Thirdly, the application of one or more working rollers to a toothed cylinder when employed for opening and cleaning cotton and other fibrous materials.

Fourthly, in an improved mode of constructing the grids for machines used in opening, cleaning, and carding fibrous materials, when employed in combination with revolving cylinders or drums, or when employed in segments of circles; and

Fifthly, in making the feed rollers of carding engines, one with a plane surface, and the other with a toothed surface.

In order that my said improvements may be fully understood and readily carried into effect, I will now describe them by the aid of the accompanying drawings, reference being had to the letters and figures marked thereon.

Fig. 1, is a longitudinal section of a machine for opening and cleaning cotton and other fibrous materials to which my improvements are applied.

Figs. 2 and 3, are detached views of parts of the same.

a, is the feeding apron, and *b*, *b*, the feed rollers, to which a slow rotary motion is imparted in the ordinary manner; *c*, is a drum, furnished with straight edges or rulers, c^1, into which the teeth, c^2, are rivetted, or otherwise fixed, to form combs; and c^3, is a sheet metal or other casing; to fill up the spaces between the rulers, c^1, these casings may be dispensed with; the teeth, c^2, and the rulers, c^1, are so placed that the points of the teeth project rather more from the circumference of the drum than the outer edges of the rulers, c^1; consequently, the points of the teeth first penetrate the fibrous material, and prepare it to be acted upon by the rulers in which the teeth are set. The grid, *d*, placed under the drum, *c*, is formed of angle-shaped bars; the object of this peculiar shape is to obtain a sharp or nearly sharp edge inclined towards the combs of the drum, and to afford increased facility for the escape of dirt or other impurities mixed with the fibrous material carried forward by the combs, c^2, which fibrous material is taken off these combs by the combs, e^2, of the drum, *e*. The fibrous material is delivered by the combs, e^2, to the fine toothed cylinder, *g*, which is similar to that referred to in the Specification of Letters Patent granted to Henry Bernoulli Barlow, on or about the 2d of September, 1854; in this instance the fibrous material is carded off the combs, e^2, by the cylinder, *g*, the ruler or straight edge of each comb serving to hold up the fibrous material while it is being carded off by the toothed cylinder, *g*. The motes, seeds, or other impurities projecting beyond the teeth of the fine toothed cylinder, *g*, are struck off by the revolving guard, *k*, (which is made in the manner described in the Specification of Letters Patent granted to me on the 18th of January, 1849,) and drop on the drum, *c*, and then into the box, *j*, through the grid, *d*.

The roller, *q*, which is covered with fine teeth, may be applied to the circumference of the cylinder, *g*, acting like a worker for more effectually opening the fibrous material. Two or more rollers, similar to *q*, may be applied to the cylinder, *g*, if requisite. The fibrous material is stripped from the roller, *q*, and cylinder, *g*, by the beaters, *h*, and brushes, h^1, or by a brush of the usual construction. The grid, *i*, is placed under the beaters and brushes, *h*, and h^1, to allow the fine dirt or other impurities loosened from the fibrous material to drop on to the drum, *e*, and through the grid, *f*, into the box, *j*. The fibrous

material passes from the beaters and brushes, *h*, and h^1, over the table, *l*, to the perforated cage, *m*, which delivers it over the incline, *n*, into a suitable receiver; or, the fleece of fibrous material, thus produced, may, if preferred, be made into a lap by a lapping machine, similar to those usually applied to blowers. In some cases it is desirable to pass the fibrous material two or more times through the machine. The working parts of this machine are surrounded by a casing, through which air is admitted at *o*. The fan, *p*, is to produce a partial vacuum in the cage, *m*, in the ordinary manner.

In placing the combs on the circumferences of the drums, *c* and *e*, care should be taken that all the teeth, c^2 and e^2, do not revolve in the same vertical plane, but that they should be equally divided, so that they may act evenly on the fibrous material brought forward by the feeding rollers. I prefer to place a greater number of combs on the circumference of the drum, *e*, and to make the teeth, e^2, finer than the teeth, c^2, but in other respects the drums are similar; the grid, *f*, placed under and partly round the drum, *e*, is made of bars similar to those in the grid, *d*. The arrows in the drawing indicate the direction in which the various parts revolve. The relative velocity of the various parts depends very much upon the material to be opened and cleaned; as a general rule, it will be sufficient to state that the circumference of the drum, *e*, should move at twice the velocity of the drum, *c*, in order that the fibrous material brought forward by the combs, c^2, may be stripped and carried forward by the combs, e^2. The drum, *c*, may be put in motion by a strap passing around a pulley on the axle of the drum, and the other parts of the machine may be driven by the straps and pulleys indicated by the dotted lines in fig. 1, or toothed wheels may be employed instead of straps and pulleys.

When only one drum with combs is employed, the drum, *e*, is placed in nearly a vertical position under the cylinder, *g*, the drum, *e*, is dispensed with, and the other parts of the machine remain nearly as shown; I would, however, remark that I prefer the arrangement shown in the drawing.

My improvement in carding cotton and other fibrous materials, consists in making the upper feed roller (when no licker-in is employed) with a plane surface, and in making the lower feed roller with teeth, made on the same principle

as those on the cylinder marked *g*, in fig. 1. By this arrangement the fibrous material is carded by the main cylinder over the plane surface of the upper feed roller. When a licker-in is employed, the position of the feed roller is reversed, and the licker-in draws the fibrous material over the plane surface of the lower feed roller.

Having thus particularly described the nature of my invention, and the manner of performing the same, I wish it to be understood that I make no claim to the general arrangement of the machine shown and described for opening and cleaning fibrous materials, nor do I claim any of the well-known parts of the machine which I have shown to illustrate my present invention;—

But what I do claim is,

First, the drums with combs, as described, when used separately or combined, for opening and cleaning fibrous materials.

Secondly, a drum or drums with combs, in combination with a toothed cylinder, *g*, as described.

Thirdly, the application of one or more working rollers similar to *q*, in combination with a cylinder, *g*, as described.

Fourthly, the application of the improved grids shown and described, when employed in combination with revolving cylinders or drums, or employed in segments of circles; and

Fifthly, making the feed rollers of carding engines, one with a plain surface, and the other with a toothed surface, as described.—In witness, &c.

FRANCIS ALTON CALVERT.

Specification of the Patent granted to AMEDEE LOUIS BEUDANT, *and* JEAN LOUIS MARIE PAUL BENOIT, *of Paris, in the French Empire, Engineers, for Certain Improvements in Treating Ores of Copper containing Arsenic and Antimony.*—Dated May 6, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The treatment of copper ores may be reduced to the treat-

ment of a coarse metal or matt containing sulphur, iron, copper, antimony, and arsenic, in variable proportions, and sometimes other metals, such as silver and gold. The ordinary treatment of ores containing arsenic and antimony consists in driving off or volatilizing the arsenic and antimony by successive roastings in presence of pyritous materials. This operation is repeated several times, and the materials are melted after each roasting; the antimony and arsenic are thus at last driven off.

By our invention we separate the copper from the antimony and arsenic, and we obtain the antimony and a large portion of the arsenic in the metallic state, and nearly pure, by a precipitation effected in the melted matt, and we volatilize the remainder of the arsenic during the operation. We obtain this result by certain operations or modes of treatment, which may be employed together or sparately.

The first mode of treatment is as follows:—Into the melted matt we introduce a quantity of metallic iron, either wrought or cast, which precipitates nearly all the antimony and arsenic, in combination with a quantity of iron and copper, varying with the temperature and the state of the matt. A small quantity of antimony and arsenic generally remains in the matt, which is precipitated by adding about one or two per cent., more or less, of lead or galena, and continuing the action of the iron. The matt is thus almost entirely deprived of antimony and arsenic. A small quantity of antimony and a considerable proportion of arsenic are volatilized during the operation. If the matt contains a large quantity of sulphur, some roasted ore is added in order to diminish the quantity of iron required for the precipitation. The antimony and arsenic thus obtained are melted with a mixture of ore and iron pyrites. The copper and iron are thus dissolved, and the antimony and arsenic are left nearly pure, while the cupreous matt is treated again in a subsequent operation.

The second mode of treatment is as follows:—We add lime or roasted ore, or a mixture of the two, to the melted matt, and we cover the surface with charcoal or carbonaceous matter, and we thus obtain a metallic button or mass of antimony and arsenic, either pure, or mixed with iron and copper, in quantity varying with the degree of sulphuration of the matt and the quantity of lime and roasted ore employed. As in the first mode of treatment a variable

proportion of arsenic is volatilized while the rest remains with the antimony, the action is completed by the addition of a small quantity of lead or galena, assisted by the action of metallic iron or by the action of the charcoal on the surface. The remainder of the antimony and a portion of the lead are thus precipitated. As an example of this mode of treatment, it may be mentioned that a grey copper or coarse metal, consisting of sixty parts by weight of proto-sulphuret of iron, twenty parts of sulphuret of copper, and twenty parts of sulphuret of antimony, was melted, with the addition of a mixture of sixteen parts of lime and six parts of roasted ore. A button of antimony weighing thirteen parts was obtained, and the operation was completed by the addition of two parts of galena, and stirring the mixture with a piece of iron.

The third mode of treatment is as follows:—We add to the melted matt a sufficient quantity of roasted ore to saturate the excess of sulphur, and we add metallic lead, which precipitates the antimony and arsenic, which carry with them a quantity of lead, varying with the time which is allowed to elapse after the addition of the lead, the state of sulphuration of the matt, and the quantity of lead added. The operation may be so conducted as to obtain a complete precipitation of the antimony without its carrying with it more than a very small quantity of lead.

In lieu of employing metallic lead, galena may be added to the matt, together with roasted ore or lime, or both, and the whole is then covered with charcoal or carbonaceous matter. The antimony and arsenic are thus precipitated. The button or lump of antimony and arsenic contains a certain quantity of lead, copper, and iron.

By these modes of treatment we remove the antimony and arsenic in the metallic state by precipitation, and by volatilizing a portion of the arsenic. We thus obtain matts deprived of antimony and arsenic, and from which the copper may be extracted, in the same manner as from the matts obtained from the purest ores, which are free from antimony and arsenic, whose presence is so injurious to the quality of the copper. Besides obtaining purified matts, we obtain, as accessory products, firstly, a mixture of antimony and arsenic nearly pure, or containing a little lead; and, secondly, a mixture of antimony and arsenic containing copper and iron, which have been carried down in the precipitation. To separate the copper carried down in the

second case, the cupreous antimony is melted with a mixture of pyrites and ore in small quantity; the iron and copper thus become sulphuretted and pass into the matt, while the antimony and arsenic remain at the bottom nearly pure. The matt thus produced carries away a little antimony and arsenic; it is treated like the matts which are to be purified, and mixed with them.

In these processes, the gold and silver, if present, are concentrated in the antimony and arsenic, from which they are separated by any of the known means.

The different modes of treatment, hereinbefore mentioned, are applied in nearly the same manner, and in the same or similar furnaces; it will, therefore, suffice to describe one series of operations more in detail. A great variety of furnaces may be employed, provided that they have an internal cavity in which the antimony may collect.

The accompanying drawing shows a reverberatory furnace adapted for the purpose.

Fig. 1, is a longitudinal vertical section, and

Fig. 2, is a horizontal section of the furnace. A, is the grate; B, is the bridge; C, is the arch or roof of the furnace; D, is the bed, which slopes down to the cavity, E, in which the melted antimony and arsenic collect; F, is the chimney.

The matt is melted on the bed of the furnace, and the workman judges from its colour whether it contains sufficient sulphur to saturate the different elements and convert them into protosulphurets, and if it does not appear to contain sufficient sulphur a portion of pyritous ore is added.

The colour of the matt is a very correct test or indication to the eye of the workman after a little practice. When the matt is well fused, a mixture of lime and roasted ore is added, in the proportion of about eighty parts of lime and thirty parts of roasted ore for each hundred parts of sulphuret of antimony contained in the mass. The proportions admit of considerable variation, and we only mention the preceding proportions as having been found to produce a good result. After the whole mass, with these additions, is completely fused, we place some charcoal or other carbonaceous material on the surface, and continue the heat; the antimony and arsenic collect in the cavity in the bed, from which they are tapped or run out;

about two per cent. of galena is then added to the remaining matt, and it is stirred with an iron tool. A fresh portion of antimony containing some lead collects in the cavity, and is tapped and run out; the matt is then also run out of the furnace. If the last portion of antimony has carried down a little lead with it the matt may be considered to be pure; but if the antimony does not contain any lead, a small portion of lead should be added to the matt before running it out of the furnace.

By these means, which are simple and easily understood by the workmen, we succeed in purifying the matt by a single fusion from the antimony and arsenic which it contains. The matt may then be treated like those now obtained from pure minerals, by submitting it to a roasting and fusion.

The treatment hereinbefore described is applicable both to the rich matts and the matts of the first fusion, so that if the first treatment should not have entirely removed the antimony and arsenic, owing to negligence on the part of the workman, or any other cause, the rich matt may be purified from the last portions of antimony and arsenic by again treating it by one of the modes hereinbefore described, as for example, by means of a piece of iron; by this means we separate not only the remaining antimony but also the lead. The more or less red colour of the piece of iron employed in the process shows whether the copper is free from antimony. The antimony thus separated contains copper, and may be melted and passed through the processes with the matts of the first fusion. The purified matt is reduced by the ordinary means, and furnishes a very pure copper.

Having now described the nature of the said invention, and in what manner the same is to be performed, we wish it to be understood that what we claim is, the mode or modes of separating antimony or arsenic from copper ores by precipitating the antimony and arsenic in the metallic state, in manner hereinbefore described.—In witness, &c.

AMEDEE LOUIS BEUDANT.
JEAN LOUIS MARIE PAUL BENOIT.

Specification of the Patent granted to WILLIAM BALL, *of Chicopee, in the County of Hampden, State of Massachusetts, United States of America, for Improvements in Machinery for Stamping Ores.*—Dated March 25, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—

Fig. 1, denotes a top view of my machine;

Fig. 2, is a front elevation;

Fig. 3, is a central, vertical, and transverse section through the same;

Figs. 4, 5, 6, 7, 8, 9, and 10, details which will be referred to hereafter.

In the said drawings, A, represents the framework which supports the operative parts of my machine; B, is the crushing mortar or vessel for the reception of ore, which it holds while it is pulverized by the stamper. This mortar has a bent hopper spout, M, leading into it on its rear side, and curved or shaped, as seen in Fig. 3. Within the said hopper one or more inclined plates, *a*, are disposed, as seen in Fig. 3, and are for the purpose of preventing the ore and water from being splashed or thrown out by the blows of the stamper, as when a current of water is thrown up the entrance spout it will generally strike against the underside of the deflector, and by it be thrown back into the mortar. A stamper, C, is placed within the mortar, and is operated by steam, as will be hereinafter described. The mortar rests on one or more very strong springs, D, made of india-rubber or other proper material; and it is so held or supported within the uprights or posts, *b*, *b*, of the frame, A, as to be capable of a free vertical play or movement on its supporting springs. The stamper consists of a very heavy metallic bar or rod, which is made to play up and down vertically in bearings, as seen at *c*, *d*, and through the eye of a bevel gear, E, from which projections extend into a long groove, *e*, made in the stamper so as to cause the stamper not only to revolve with the bevel gear, but to be able to rise or fall independently of it; this bevel gear is rotated by means of a bevel pinion, F, fixed on the shaft of a pulley, G, the said pulley being turned by a band proceeding from any driving

drum or power. The upper end of the stamper is connected to the piston rod, H, of a steam cylinder, I; the connexion is made by means of a circular head, *f*, fixed on the rod, H, and inserted within a cylindrical cavity, *g*, formed down in the upper end of the stamper. Under and above the head, *f*, is an india-rubber or other proper spring, *h* or *i*, the whole being covered by a plate, *k*, which is confined on the top of the stamper by screws. The valve chest of the steam cylinder is seen at, K; it receives steam from a steam generator in any proper way, and should have its induction and eduction steam passages so arranged, and its valve operated, as to cause the piston to be elevated by the pressure of the steam and depressed by the gravitating power of the stamper and piston. The valve rod, *l*, is worked by an eccentric, *m*, fixed on a shaft, *n*, arranged as seen in the drawings. On the said shaft there is fastened a pulley, *o*, around which and another pulley, *p*, fixed on a shaft, *q*, an endless belt passes. A cone drum, *r*, is also fixed on the shaft, *q*, and receives its motion from a belt which is driven by another cone drum, *t*, that has upon its shaft a fast pulley, *u*, and a loose pulley, *v*, the main driving belt being made to run on either of the latter pulleys, as occasion may require. By such mechanism the speed or vertical movements of the steam valve and the piston are produced, and rendered faster or slower, as may be desirable. From the above it will be seen, that as the stamper rod plays up and down through its lower bearing, *d*, and the stamper operates within the mortar, while the latter is made to contain ore and water, much grit or earthy particles are liable to collect on the stamper rod and wear its bearing. In the stampers of machines in general use this is a very serious difficulty, and in order to prevent it in my machine I surround the stamper rod with a basin or cup, L, which is made to rest on and be fastened to the top of the mortar, the stamper rod playing freely through the basin or through a hole in its bottom, somewhat larger in diameter than the rod; and I cause a stream of water to flow into the said basin, and from thence pass down through the hole in its bottom and around the stamper rod and into the mortar, so as to wash off from the stamper rod any silicious or earthy particles which, by collecting on it, would be carried up into the bearing and wear it and the rod while the rod is in motion. Water and auriferous ore are introduced into the mortar through the spout or hopper,

M. The stream of water, after filling the mortar to the extent required, passes off through the grating, N, placed in the front of the upper part of the mortar; this grating or grate has an inclined position given to it, as seen in the drawings, and its meshes or interstices are made of a size such as will retain within the mortar any ore that may not be sufficiently pulverized. It is inclined in the manner shown in fig. 3, instead of being placed upright, as it is in other stamping machines, for the purpose of preventing any particles or pieces of rock from being thrown through it, as is often the case when the upright grates are used. When the mortar is charged with ore the top of the charge is generally up to a level with or may be a little above the bottom of the grate. Under these circumstances a downward blow of the stamper on the mass will often cause pieces of rock or ore to be projected laterally and horizontally or thereabouts with great force,. often such as will throw them entirely through the grate, and thus spoil it and require a new one to be inserted. By arranging the grate in the inclined manner, as represented in the drawings, pieces of rock, when so thrown against it, will be deflected by means of its inclined surface, and will thereby not act on such surface with a power sufficient to enable them to pass through or injure the grate, and they will be thrown upwards from the grate and back into the mortar.

Fig. 4, denotes a side view of the stamper, and its rod.

Fig. 5, is a bottom view of it.

Fig. 6, is a top view of the stamper, or stamper head, as it is sometimes termed.

Fig. 7, is a bottom view of the stamper rod.

Fig. 8, is a section through the stamper head, rod, and key.

Fig. 9, is another side view of the stamper and its rod, showing the end of the wedge key. The stamper head, *w*, is fastened to its rod by means of a dovetail connexion, *x*, and a wedge key, *y*. On one side of the dovetail, instead of being straight like the other, or that against which the wedge key is forced, is made curved to the arc of a circle, as seen at *a*, *b*, *c*, in fig. 6; the adjacent side of the recess in which the dovetail is placed being similarly curved, as seen at *d*, *e*, *f*, in fig. 7. When the stamper head is put in place, and the key driven up, the curved edges of the dovetail surfaces not only allow them to slide upon each other for the express purpose of allowing the

opposite or straight side of the dovetail, *x*, to turn either way, and thereby form a universal dovetail connexion, whereby any imperfection in the rough cast-iron dovetail, *x*, will not prevent the key, *y*, from bringing it to bear firmly on three parts of the two sides, or the straight side, to adjust itself to the key for a firm and equal bearing, but they prevent it from moving laterally out of place. The wedge key is driven into the connexion on that side of the stamper head which is nearest to the side of the mortar, the side of the mortar serving to keep the key in place. The lower part of the stamper is made so as to have a larger stamping surface on one side of the vertical axis of the rod than there is on the other, that is to say, the centre, d^1, of the stamping surface is arranged at a distance from the axis, e^1, of the rod, see fig. 5; this, as the stamp is rotated, causes the lower end of the stamp to continually strike in a fresh place on the ore or charge, and prevents it from packing in the mortar, as is constantly the case where a cylindrical stamp is used. It also exposes a fresh quantity to each blow, and enables each blow by its concussion to loosen the particles of that part of the charge on which it does not directly act. The improved mode of connecting the stamper head to its rod is of great convenience and advantage, as it enables the stamper head to always keep itself in adjustment, however irregular it may wear on its bottom, and thereby prevents it from accidents which are constantly occurring to the stamper heads as usually made and applied. Where stamps for crushing ores are operated by the direct action of steam to the stamp shaft, when the stamp head has descended to a certain point it is allowed to ring a bell, that the attendant may replenish the mortar with ore; should he neglect to attend to his duty, and the stamp continues to descend, the lower head of the cylinder will inevitably be knocked out by the piston. To remedy this defect I have adopted the device represented in fig. 10; in this figure the steam is admitted both above and below the piston, which thus descends with greater force and speed than when allowed to fall by its weight alone. At a^2, the diameter of the cylinder is enlarged (fig. 10), so that on the piston arriving at a certain point the steam passes freely round it, and the operation of the stamps is instantly stopped. To prevent the piston from being worn away unevenly there is an enlargement at the upper end of the cylinder, correspond-

ing to that at the lower, by which means the wear upon the packing is equalized. There are various methods by which this end may be accomplished; for instance, the piston as it descends may be made to let off a weighted lever, by the fall of which a throttle valve in the steam pipe may be closed, and thus the operation of the stamp will be checked; I do not, therefore, confine myself to the use of the particular means represented and described above. When steam is admitted both above and below the piston, as seen in fig. 10, it is evident that the piston will descend much more rapidly than it ascends, and consequently, that the valve should remain open a longer time for the admission of steam beneath the piston than is required when the steam is passing above the piston; this demands an irregular motion of the valve, which cannot be imparted to it by an eccentric arranged in the ordinary manner. To give to the valve this irregular motion I employ the eccentric gears, b^2 and c^2 (fig. 10), the former being upon the driving shaft, and the latter upon the shaft of the eccentric which operates the valve; by this means, where the shaft of the gear, b^2, is driven by an equable motion the required motion of the valve is produced.

Having now set forth the nature of this invention, and explained the manner of carrying the same into effect, I wish it to be understood that, under the above recited letters patent, I claim the combination of the washing basin, or contrivance, L, with the stamp rod and its bearing, so as to operate in the manner and for the purpose as specified.

I also claim the deflecting plate in the entrance spout or hopper as combined with the same, and the mortar and stamper, and used for the purpose specified.

I also claim the improvement in the stamp head, or the making of it with a greater stamping surface on one side of its axis of rotation than it has on the other, the same being for the purpose of preventing packing of the charge as specified.

I also claim the mode of applying the stamp head to the stamp rod, viz., by means of the circular arcs or curves of the sides of the universal dovetail connexion with the wedge key, as described.

I also claim stopping the operation of the stamp by stopping the feed of the material, in the manner substantially as herein set forth, or by any other means adapted to the purpose.

I also claim the eccentric gears, b^2 and c^2, in combination with the direct action steam stamps for the purpose of communicating the required motion to the slide valve, as set forth.—In witness, &c.

WILLIAM BALL.

Specification of the Patent granted to ROBERT JOBSON, *of Holy Hall Works, near Dudley, in the County of Stafford, Ironfounder, and* JOHN JOBSON, *of Litchurch Works, near Derby, in the County of Derby, Ironfounder, for Improvements in the Manufacture of Moulds for Casting Metals.*—Dated May 15, 1855.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—We manufacture moulds for casting iron balls or bullets in the following manner:—A number of pattern bullets are fitted into holes in a plate, whose thickness is half the diameter of the bullet, and which is laid upon another flat metal plate, as shown in section in fig. 1 of the accompanying drawing.

A, A, A, are a series of loose or detached patterns fitted into cylindrical holes or perforations in the plate, B, which lies upon another flat plate, C. The half of each pattern thus projects above the plate. A moulding box, D, is placed upon the plate, B, and sand is rammed in in the ordinary manner, forming the mould, E. The mould, E, and the plate, B, are then raised a little, as shown in section in fig. 2, so as to draw the mould off the patterns, and the mould is then removed altogether, as shown in fig. 3. The patterns are kept in their proper positions by the perforated plate, B, which is again depressed to its former position, and another mould is made in the same manner, and so on; a series of half moulds are thus produced. The corresponding series of half moulds are made in the following manner:—The plate, B, and patterns, A, are covered by another flat plate, C^1, as shown in fig. 4, and the whole inverted, and the first plate, C, is then removed. The patterns are thus left upon the plate, C^1, and are kept in their places by the plate, B, the under side of which is now

brought uppermost, as shown in fig. 5. The second series of half moulds are now formed in the same manner as the first series, and one of each series being placed together, the perfect moulds for the casting of the bullets are formed, as shown in fig. 6. Proper "gates" or passages for the introduction of the metal are made during the process. The boxes are all well fitted to each other, and to the plate, B, so as to ensure their meeting correctly. The plates, C and C^1, are planed on their upper surfaces, and the plate, B, is planed on both surfaces.

The perforated plate, B, may be of a thickness equal to the semi-diameter of the bullets, as hereinbefore mentioned; or a thinner plate may be used, being supported so that its upper surface is level with the centres of the bullets while the mould is being formed, as shown at P, in fig. 7. In lieu of planing the plate, B or P, on both sides, and employing it for moulding both of the half moulds, two such plates may be employed, and only planed on one side. These two plates are fixed with their planed surfaces together, and the holes for receiving the patterns are bored through both plates together, so as to ensure their correspondence. After making one series of half moulds on the one plate, P, as in fig. 7, the second plate, P^1, and a flat plate, C^1, are laid over the plate, P, and the patterns, A, as shown in fig. 8. The whole is then inverted, and the plates, C and P, are removed. The second series of half moulds is then moulded on the plate, P^1, with the patterns resting upon the plate, C^1. In lieu of planing the plates, C and C^1, all over, they may be made with small projections under each bullet, and the tops of these projections may be planed or filed or otherwise adjusted; or these plates may be faced with lead or other soft metal, or may have recesses containing lead or other soft metal, and the patterns may be pressed or driven into the soft metal until they are all adjusted in the same plane. We prefer to employ patterns of iron or other suitable hard and smooth metal or substance, in order that they may readily detach themselves from the sand by their own weight when the mould is raised with the plate.

By the mode of applying the plates, B and P, or the double plates, P, P^1, we are enabled to mould several balls or bullets together, and to ensure the correct meeting of the two half moulds. If it were attempted to mould both

half moulds from the same arrangement of patterns and plate, as, for example, from that described in reference to fig. 1, it would be necessary to adjust the positions of the holes in the plate, B, with very great care, so that the patterns might be placed symmetrically on each side of the centre line of the plate. This might be effected with a single pattern, but would be a difficult and expensive operation when several patterns are to be employed with the same plate and boxes, as hereinbefore mentioned. In casting bullets of one inch in diameter, twenty or thirty may easily be moulded at once by means of our invention.

Having now described the nature of our invention, and in what manner the same is to be performed, we wish it to be understood that we do not claim generally the application of a plate for supporting the sand while the pattern is being separated from the mould;

But what we claim is,—

Firstly, the peculiar mode or modes of manufacturing moulds for casting metal balls or bullets, by means of a series of three or more loose pattern balls or bullets arranged in a series of holes or perforations in a plate and resting loosely upon another plate, or upon a series of supports which are all in the same plane, and so arranged that the patterns may detach themselves from the mould by their own weight while the mould is raised or supported by the perforated plate, as hereinbefore described.

Secondly, the mode or modes hereinbefore described of manufacturing moulds for casting metal balls or bullets, by means of a series of three or more loose pattern balls or bullets arranged in a series of holes or perforations in a plate whose thickness is equal to the semi-diameter of the patterns, and which plate together with the patterns rests upon another flat plate, the whole being so arranged that the two half moulds may be moulded on contrary sides of the same perforated plate, as hereinbefore described.—In witness, &c.

ROBERT JOBSON.
JOHN JOBSON.

Specification of the Patent granted to Christopher Hill, *of the Great Western Railway, Chippenden Station, for Improvements in the Manufacture of Lubricating Matters.*—Dated September 13, 1856.

To all to whom these presents shall come, &c., &c.— This invention consists in combining a saponified substance made from the materials generally used in the composition of soap and a gelatinous substance made from vegetable matters, and amalgamated with animal, vegetable, or mineral fats and oils, together with caustic alkali, soda, or lime water; and in combining rosin oil or rosin grease, commonly known as anti-friction grease, with dead or heavy oil, fish or vegetable oils, lime or argillaceous earth.

And in order that my said invention may be most fully understood and readily carried into effect, I will proceed to describe the methods in which I prefer to prepare lubricating matters for lubricating railway and such like axles, where great speed is required. I prepare a saponified substance, made after the usual method of soap boiling, and I keep the same down to what is called "a reduced soap," that is to say, to retain about four times more fluid than hard soap, or I reduce the common hard soap by remelting and adding four parts of water to the same.

I prepare a vegetable pulp or gelatinous matter by taking ½ cwt. of flour, and 3 cwt. of water, and mix them well together, and to this I add 3 cwt. of a solution of caustic soda or potash at the specific gravity by Twaddle's aërometer of 1·120, and I add this preparation to 10 cwt. of the "reduced soap" such as above described, whilst in a melted state, and I mix them intimately together; and lastly I add 3 cwt. of tallow and 1 cwt. of palm oil, or other fats or oils may be used, and I place the mixture over a slow fire, so as to make the whole perfectly liquid. I stir the ingredients well together until they are intimately mixed. I then cool down, and the process is complete. I sometimes add 1 cwt. of pure, clean, argillaceous earth.

To make a common cheap grease for slow speeds, tramway-trucks, road-carts, &c., I select a pure, clean, argillaceous earth perfectly free from grit, and which upon analysis contains about 4 parts of potash in 100 parts. I

reduce this to a fine powder, and take 2¼ cwt. of it, to which I add about the same quantity of rosin oil, or rosin oil with shale, or paraffine, or other dead oil, and one part of castor oil, or rape, or other vegetable oil. I mix these well with the argillaceous earth, and add about 1 cwt. of fresh thick lime-water, or cream of lime, or in place thereof about 7 lbs. of alkali solution, of the strength previously mentioned. In some cases I omit either of the last, and combine the oils and earth together; or, in place of the above, I take 7 lbs. of wheat flour, and mix it with 28 lbs. of cold water. I then add 14 lbs. of alkali solution, to which I add, and well stir together until thoroughly combined, ½ cwt. of rosin oil. I then take 2 cwt. of argillaceous earth and 2½ cwt. of rosin oil, and mix these two well together, so as to be perfectly free from specks. I then add the vegetable pulp previously made. When they are well mixed, I add 1 cwt. of thick lime-water, stir them thoroughly, and then leave it all to "set up," which will take place in a short time.

Having thus described the nature of my said invention, and the manner of performing the same, I would have it understood that I do not confine myself to the proportions above described, nor do I make any claim to the employment of the pulp or gelatinous matter obtained from vegetable substances in the preparation of lubricating substances, nor do I claim any of the fatty or oily bodies above-mentioned, when separately considered;

But what I claim is,—

The combination or compound first herein described, and I also claim the combinations or compounds secondly herein described.—In witness, &c.

CHRISTOPHER HILL.

Specification of the Patent granted to GEORGE HUTCHISON, *of* 160, *Hope-street, Glasgow, for Improvements in the Treatment of Oils and Fats.*—Dated September 12, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in treating oils and fats in the following manner:—

Sulphuric acid is cautiously added to the oil or fat, and the mixture is well stirred to avoid carbonizing the oil or fat. When they have been left together for a day or more, new products are formed, and the mixture then contains sulpholeic, sulphomargaric, and sulphoglyceric acids. These are all soluble in alcohol, and by the addition of a suitable quantity of this solvent the sulpho-glyceric acid is separated by subsidence.

The remaining fatty acids, being mixed with a further quantity of alcohol, undergo decomposition, and form combinations of metaoleic and metamargaric acids with a portion of the alcohol in presence. This change takes place slowly when the solution is set aside cold, but proceeds much more rapidly with the assistance of heat. Instead of adding fresh alcohol to the fatty acids separated as above mentioned, and then boiling, I prefer passing a stream of alcoholic vapour through the solution till the desired effect be produced. By treating oils and fats in this manner, they are rendered more suitable for use in lubricating and burning.

And in order that my said invention may be most fully understood, and readily carried into effect, I will proceed to describe more particularly the process which I employ.

When treating lard oil, for example; to 100 gallons of oil I carefully stir in, so as to avoid charring the oil, 6½ gallons of sulphuric acid, of specific gravity 1·850; or when I do not desire to effect so complete a decomposition of the oil, that is to say, when I do not require to produce so fluid a product as that obtained by the use of the above quantity of acid, I reduce the quantity thereof, and for some purposes I have found that it may be reduced to 4 gallons with advantage. The mixture of oil and acid I allow to stand for a period not less than twenty-four hours, so as to allow time for the sulphuric acid to combine with the oil, thereby forming sulpholeic and sulpho-glyceric acids, and I then add to and well mix with it 25 gallons of alcohol; on standing the compound separates into two layers, about 15 gallons of the alcohol added subsiding, and carrying with it the sulpho-glyceric acid. When solid fatty matters are treated in this manner, it is necessary to increase the quantity of alcohol employed at this stage of the process, so as to obtain a mixture sufficiently fluid to allow of a complete separation of the alcohol not dissolved by the fatty matter under process.

When the mixture has separated into two distinct strata, as above mentioned, the lower strata is removed and the alcohol which it contains is separated by distillation, and may be again used. The upper stratum is run into a closed vessel, into which vapour of the ordinary, or other alcohol (by preference of the ordinary alcohol) is conducted by a pipe which descends nearly to the bottom of the vessel, so that the vapour bubbles up through the liquid which it contains, and there is another pipe connected with the upper part of the vessel which conducts to a suitable condenser the portion of the vapour which is not absorbed. When the oily liquid loses its acid reaction, as indicated by test paper, it is known that the whole of the sulpholeic acid is decomposed, and that further treatment with alcoholic vapour is unnecessary. On being allowed to stand the contents of the vessel will again separate into two layers, which are run off separately; the lower layer consists of condensed alcohol mixed with sulphuric acid liberated by the decomposition of the sulpholeic during the process; this mixture is distilled to recover the alcohol. The upper layer consists of the oily matter combined with a certain quantity of alcohol, and holding a further quantity of alcohol in solution. This last mentioned alcohol is generally not in quantity sufficient to repay the trouble of recovering it; but when it is so it is separated by placing the mixture in a still and moderately heating it until it ceases to evolve alcoholic vapours; it is then removed from the still and caustic soda or potash is added until the oil has an alkaline reaction, and the mixture is allowed to stand. After some time a soapy liquid separates, which is run off, and the remaining oil is well washed with water, and when filtered is ready for use. It is very suitable for lubricating purposes, and also for burning in lamps. When substances containing a considerable quantity of stearine are treated by this process the product obtained will contain matters which are more or less solid at ordinary temperatures; these matters I separate from the more fluid portions of the product by cooling, and filtering, and pressing, as is well understood, and they are very suitable for the manufacture of candles.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details of the process described.

But what I claim is,—

The treating oils and fats with sulphuric acid so as to produce sulpholeic, sulpho-margaric, and sulpho-stearic acids, and then decomposing these substances by means of an alcohol.—In witness, &c.

GEORGE HUTCHISON.

Specification of the Patent granted to CHARLES GOODYEAR, *of Leicester-square, in the County of Middlesex, for An Improvement in Combining Gutta Percha and Asphalt or Pitch.*—Dated August 30, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in combining gutta percha and asphalt or pitch. Heretofore it has been proposed to combine gutta percha and asphalt by masticating the same together in like manner to what gutta percha and india rubber have been usually masticated, both alone and in combination. Now my improvement consists of combining gutta percha with asphalt or pitch by the aid of hot water, by which the two matters are softened and made comparatively fluid. And having combined these matters together they are, when desired, further combined with sulphur, also with india rubber, and also with other matters, and the various compounds thus produced are, when required, subjected to high temperatures, in order to produce the change which is consequent upon applying high temperatures to gutta percha or india rubber, or both, combined with sulphur or matters giving off sulphur by heat.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

Heretofore when combining gutta percha and asphalt or pitch, it has been usual to employ masticating machines, so as by mechanical effort to mix them in as uniform a manner as possible, and although heat has been applied to heat such masticating machines, the heat has not been such as to render the substances into a comparatively fluid state, so that they will run or pour freely. And I have discovered that it is of great importance, when manufacturing articles

of compounds of gutta percha and pitch, or asphalt, whether they be combined with other matters or not, that a great advantage is derived by causing them to be heated to so high a degree as to assume a comparatively fluid state, either together or separate; and it is found preferable that they should be caused to melt when together, though they may be first rendered fluid separately and then brought together and mixed whilst in the fluid state. The most convenient means of accomplishing this mixing is by the aid of hot water, as all burning of the substances may be prevented. For this purpose a close vessel is used, into which the substances are introduced roughly, mixed with a quantity of water, and the temperature raised to such a degree as to melt the gutta percha and the asphalt, or pitch, and when the substances are thus rendered fluid, they are to be well stirred, in order to blend them well together; the quantity of water required is small, being for the most part used to prevent the unequal heating of the other substances. The gutta percha and asphalt, or pitch, having thus become well blended by being mixed (in the proportions desired) when in a comparatively fluid state, they may be further combined with sulphur, or with india rubber, or both, and with other matters in the ordinary manner; but when combining oxides of lead with such compounds it is preferred to do so whilst they retain a fluid state.—In witness, &c.

CHARLES GOODYEAR.

Specification of the Patent granted to PETER WARD, *of Liverpool, in the County of Lancaster, Chemist, for An Improved Composition for Coating the Bottoms of Ships.*—Dated October 8, 1856.

To all to whom these presents shall come, &c., &c.—My invention has for its object the preparation of a composition for coating the bottoms of ships to prevent the adhesion of barnacles thereto. For this purpose I prepare an earthy soap in the following manner:—I make an alkaline soap in the ordinary way, which is well understood, from a caustic soda lye, fatty matter, and rosin; I prefer in the manufacture of this soap to use palm oil or lard, or

a mixture of palm oil and lard with an oil, so as to produce an earthy soap that will become thin when heated.

When the soap has been finished I draw off from the spent lyes from the soap pan and pump into the pan as much solution of muriate of lime (chloride of calcium), at about thirty degrees of Twaddle's hydrometer as will decompose the alkaline soap. After being well boiled, the alkaline soap will be found to have been all decomposed. This may be ascertained by taking a sample of the earthy soap and boiling it in water; if the water remains clear, there is no undecomposed soap present, but if the water becomes turbid, then more muriate of lime should be added, and the boiling continued until it has been found to stand the above test. The earthy soap thus formed I transfer from the soap pan to an iron pan, with a fire beneath, where it is boiled or heated until the whole of the water has been separated. I then add from 15 to 20 lbs. of oxide of copper, previously dissolved in about 40 lbs. of rosin to each cwt. of earthy soap, and boil them well together. Or in place of oxide of copper, metallic copper or other combinations of copper or other poisonous metal may be added to the earthy soap; but I prefer to use oxide of copper.

In applying this earthy soap as a coating to the bottoms of iron or wooden ships it is necessary to heat it, and also to reduce its consistence with some fatty matter or oil, so that it may be laid on with ease with a brush. In place of the salt of calcium, salts of barium, stronchium, magnesium, or alumina may be used in the preparation of the earthy soap, and I operate with them in the same manner as I do with the chloride of calcium.

Having now described my invention, and in what manner the same may be performed, I would have it understood that I make no claim to the mode of preparing an earthy soap;—

But what I claim as my invention is, the preparation of a composition for coating ships' bottoms by mixing oxide of copper, or other metallic oxide or compound, with an insoluble soap of lime or other earthy base.—In witness, &c.

PETER WARD.

Specification of the Patent granted to Louis Cornides, *of No. 4, Trafalgar-square, Charing-cross, in the County of Middlesex, for Improvements in Ornamenting Metal, Wood, Leather, Textile Fabrics, and other Substances.*—Dated June 25, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—My invention relates to the ornamenting the above-named materials by a new mode of applying thereto plain or coloured impressions, drawings, or photographs, for which purpose, in the first place, it is necessary to prepare the surface of the material to be ornamented as hereinafter described.

In order to explain my said invention as completely as possible, I now proceed to describe the best means I am acquainted with for carrying the same into practical effect, as follows:—

In operating upon metal for ornamenting the same, whether it be in flat sheets or in the form of a vase, or other article, the surface thereof must be rendered bright by tinning or otherwise. In operating upon wood for ornamenting the same, the surface thereof must be prepared by any of the processes in known and common use for silvering or gilding surfaces of wood. In operating upon leather or textile fabrics, and such like materials, for ornamenting the same, I use either the fabrics prepared according to the manner described in the specification of a former patent granted unto me, the said Louis Cornides, on the 3d day of April, 1855, No. 745, for certain improvements in saturating, &c., &c., so as to produce a metallized surface on such said materials.

The surface of the materials to be ornamented being thus prepared, I coat the various metallic surfaces with a solution of ox gall or a suitable transparent varnish, and when dry, I apply thereto a solution composed of four parts gelatine, one part sugar, one part of glycerine, and six or eight parts of soft water, as a coating, on which I propose to transfer the ornamental, plain, or coloured impressions, drawings, or lithographs, or to attach thereto such ornamental impressions made on a transparent, flexible, and elastic medium, or on the silvered, gilded, varnished, or japanned materials in common use; or I

prepare the surface of the said materials by attaching thereto tinfoil, foil paper, or silver paper, by means of a solution of gelatine or glue hereinbefore described, which said processes of coating, transferring, as also the mode of producing the transparent medium above referred to, and other necessary processes are set forth and described in the specifications of former patents granted unto me, the said Louis Cornides, and respectively dated the 26th of November, 1853, No. 2,762, the 23d of September, 1854, No. 2,066, and the 19th of September, 1855, 2,112; or when leather, textile fabrics, and such like soft materials, having surfaces prepared as aforesaid, are to be ornamented, the ornamental device, plain or coloured impression, may be printed direct thereon.

I now proceed to describe the manner in which I operate upon curved surfaces for ornamenting the same, by transferring impressions, et cetera, thereonto in the following manner and by the following means:—Suppose, for example, it is required to ornament the outer surface of a vase; I first prepare a rectangular, or other shaped piece of wood, by cutting a hole therein somewhat larger than the said vase. I then cover one side of such piece of wood with a piece of sheet india-rubber of moderate substance, and affix the edges thereof to the wood by nails, screws, or other suitable means; having done this, I next proceed to prepare and transfer the impression on to the surface of the india-rubber, previously coated with a gelatine solution, as aforesaid; I then coat or cover the surface of the vase with any suitable transparent varnish, and before the varnish sets or gets dry, I press the surface of the vase upon and against the ornamented surface of the india-rubber, at the same time applying heat thereto in any convenient manner sufficient to dissolve the gelatine coating upon which the ornament has been transferred, so that upon withdrawing the vase, the ornament will have left the india-rubber, and attached itself to the varnished surface of the vase; and I afterwards remove with spirits of turpentine any surplus varnish which may exceed beyond the impression or ornament thus transferred on to the said vase; and in this manner and by these means I ornament curved surfaces of whatever shape they may be, taking care to make the shape of the opening in the wood similar to the sectional configuration of the curved article which it is desired to ornament.

Having now fully described and set forth the nature and object of my said invention of "Improvements in Ornamenting Metal, Wood, Leather, Textile Fabrics, and other Substances," together with the best means I am acquainted with for carrying the same into practical effect, I hereby declare my invention to consist in, and I claim the modes above particularly described of ornamenting metal, wood, leather, textile fabrics, and other substances, substantially as set forth.—In witness, &c.

LOUIS CORNIDES.

Specification of the Patent granted to CHARLES DURAND GARDISSAL, *of* 10, *Bedford-street, Strand, London, and* 29, *Boulevart St. Martin, Paris, for Improvements in Engraving Glass and Crystals.*—Dated June 25, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—My invention relates to certain improvements in engraving glass and crystal by the aid of "resists" or "reserves," as will be hereinafter described. In this specification it will be understood by "reserve" the substances used to prevent or resist the action of the hydrofluoric acid on the bodies which may be acted on by it. The three various processes which I adopt to obtain the said reserves for engraving on glass and crystal, and which constitutes this invention, are as follows:—

The first process consists in obtaining the reserve, by distributing fatty or resinous matters reduced to powder, through fabrics or perforated tissues or substances, on the surfaces which are to be acted on or engraved by the action of hydrofluoric acid.

The second process consists in obtaining the reserve with a layer of fatty or resinous matters spread over the surface of the articles to be acted on or engraved by the action of hydrofluoric acid. This layer is afterwards ornamented by means of perforated vignettes or designs.

The third process consists in obtaining the reserve by the transfer of printings made of fatty or resinous matters, this transferring taking place on the articles or materials which are to be engraved by the action of hydrofluoric acid.

The first and second processes are chiefly applicable to plane surfaces; the third is applicable to both plane curved surfaces.

According to the first process I obtain the reserve by means of fatty or resinous powders, as follows:—The matters used for obtaining this reserve must be capable of being melted and reduced to powder or dust. Various materials have the said properties, such as colophone mixed with bees-wax, damnare resin mixed with bitumen of Judea, and bitumen of Judea mixed with a gum called "elémi."

The mixture which I use by preference is prepared as follows:—I take one part of soft "elémi," filtered through a linen cloth, and after putting it over the fire I add two parts of bitumen in powder, stirring the mixture all the time with a spatula till the whole is completely melted; after which I pour this mixture, while still warm, on a cast-iron plate, where it cools; after cooling I pulverize or reduce it to as fine a powder as possible.

In order to apply the powder, thus obtained, I rub the substance, on which the same is to be deposited, with oil or essence of turpentine; I place on this substance a perforated or bored design, either in cloth or paper, or any other suitable substance capable of presenting a thin and even coating; this done, I spread the powder on the design, in a layer of equal and sufficient thickness, which I effect either by placing the substance to be coated under a sieve containing the powder, by or introducing the same horizontally in a box, in the interior of which the above powder is introduced and put in motion or agitation. The vacant spaces of the design thus determined are coated by the deposit of the powder; I now remove the perforated design, and then heat the article on which I have operated in order to melt the material forming the reserve, which takes place without alteration of its outline; after this I submit the article to the action of the acid, using the ordinary means for engraving substances which have received reserves or spares by the ordinary means.

The second process consists in producing the spare or reserve by means of a coating or layer of fatty or resinous matter, by means of ornamental perforated designs or vignettes, as follows:—The substance which composes the coating is the same as that before referred to in carrying out the process above described. I crush this material with a mullar, moistening it, at the same time adding a

very small quantity of soapy water; I afterwards spread it on the surface to be engraved, so as to form a thin and equal coating; when this coating is dry I apply the perforated vignette or ornament on it, and with a fine close brush I take up what may be removed through the apertures of the vignette. When the design is so formed, I submit the article or surface so coated to a sufficient heat to melt the material of the reserve or spare; afterwards I retouch it, if necessary, and then submit it to the action of the acid to effect the engraving. The vignettes or design plates must be thin, and at the same time sufficiently rigid to produce clean and pure designs or images and to resist the action of the brush. Brass or copper is the material I use by preference for this purpose.

The third process, which consists in obtaining the reserve or spare by the transfer of printings made with fatty or resinous matters, is as follows:—The printings or designs, made by means of metal plates or lithographic stones, engraved of a depth of two seventy-fifths of an inch. I use brass or steel plates when I desire to obtain very fine and close lines, but the lithographic stone will answer the purpose when wider lines and forms are alone required. I engrave the lithographic plates by means of fatty reserves or spares and dilute muriatic acid. The reserves are obtained by the bitumen dissolved in essence of turpentine, which I apply by means of a brush. The en-engraved stone or plate receives a coating of ink which is to give the impression. This ink is composed of a mixture as follows:—Of bitumen, three parts; essence of turpentine, three parts; and stearine, two parts. The mixture is heated till completely melted, and then filtered, and afterwards cooled; it produces a very thick ink, which is spread on the plate with a flexible knife; I then pass horizontally over this plate a metallic rule or slide, at the same time exerting sufficient pressure to take up the ink on the high parts of the plate or stone, leaving it in the hollow parts only. I apply on the plate, thus engraved and coated, a thin and sized sheet of paper, without any other preparation, and I submit the said plate to direct pressure. A screw press, the upper plate of which is furnished with some thicknesses of cloth or of india-rubber, gives a good result; but any other suitable means may be employed. After having drawn back the plate, I now take off the paper, which has thus received a considerable thick-

ness of ink; I wet this paper so coated with the ink in water weakly acidulated with hydrochloric acid; I next place it over the surface of a water bath, heated to the temperature of about 120 or 130 degrees Fahrenheit. These two operations have for their object to reduce or weaken the adhesion of the ink to the paper. When this result is arrived at, I apply the paper to the surface to be engraved, this latter having previously received a thin coating of oil or turpentine; I then apply a slight pressure with a cylindrical pad in order to fix the ink; I then remove the paper, and the reserve is now deposited; some hours are required for drying the ink to ensure its adhesion to the article or surface which receives it. The surface, after having been retouched, if necessary, is submitted to the action of the acid, either by immersion or by partially covering it with the acid. The contact of the acid may be continued for some hours, and numerous washings take place without injury to the reserves.

By the above processes complicated designs are as easily produced as designs of the simpler kinds, while at the same time they are of a nature to extend the art of engraving on glass and crystals by means of hydrofluoric acid. By this means white glass, coloured glass in one or more layers and colours, plate and "looking glasses" and plate glass, either polished or unpolished, and generally the products of crystal and glass works, such as drinking glasses, lamp or light shades, and other articles, either in a polished or unpolished state, which have heretofore been ornamented, at great expense, by the wheel engraving or by hydrofluoric acid engraving, may thus be easily and cheaply engraved or ornamented.

Having described the nature of my invention, and the manner of performing the same, I wish it to be understood that what I claim as my invention is, engraving glass and crystal with hydrofluoric acid by the means or aid of "reserves," "spares," or "resists," obtained or produced by either of the three processes, as hereinbefore described. —In witness, &c.

CHARLES DURAND GARDISSAL.

Specification of the Patent granted to CHARLES GOODYEAR, *jun., of Leicester-square, in the County of Middlesex, for Improvements in the Manufacture of Penholders and Handles for Penholders.*—Dated September 18, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in the application of "protean" or india-rubber hard compound in the manufacture of penholders. I take sheets or bands of caoutchouc prepared in the usual manner for vulcanizing or hardening, and which may be composed partly of gutta percha or any similar substance, although I prefer the usual compound of about two-thirds caoutchouc and one-third sulphur, which proportions may, however, be widely varied at the will of the manufacturer. For the present purpose the prepared caoutchouc compound should be spread in the usual manner about one-sixteenth of an inch in thickness. This I cut into strips of convenient length and width. I then take rods of tinned steel, or other material, of convenient size and shape, upon which I form a tube, either parallel or tapering to a point, by winding the strips of prepared caoutchouc thereon, commencing at one end and winding spirally towards the other end. These rods so covered are afterwards placed in boxes of pulverized talc, plaster of Paris, or other material, and there exposed to suitable degrees of heat for a sufficient length of time to produce the requisite degree of hardness, as is well understood. The hollow stem of india hard compound thus formed may be used as a handle for a metal penholder, as wood is now used, or it may be made into a penholder, by introducing a plug of the same material into the larger or open end of the stem, such plug being so formed as to fit the interior of the stem tightly at a short distance from the end, and more loosely towards the end, so that the metal pen may be firmly held by inserting it between the plug and the stem. The penholders thus made in spirals may have the edges joined to each other, or the edges may at the upper part be prevented joining or adhering to each other, commencing a short distance from the bottom (say two inches). This may be done by covering the edges with pulverized talc, or other similar substance,

where it is desired to prevent the adhesion. The advantage of penholders so made is that they are pliable and ornamental.

Having thus described the nature of my invention, I wish it to be understood that what I claim as my invention is,—

The manufacture of hollow penholders, or stems or handles for penholders, of "protean" or india-rubber hard compound, formed upon rods, substantially as hereinbefore described.—In witness, &c.

CHARLES GOODYEAR, JUN.

Specification of the Patent granted to RUDOLPH SCHRAMM, *of* 6, *Warwick-crescent, Harrow-road, Paddington, in the County of Middlesex, for A new Process for Treating Cotton Seed for the purpose of and previous to the Obtaining of Oil from it.*—Dated August 31, 1855.—(A communication.)

To all to whom these presents shall come, &c., &c.—The said invention relates to a peculiar mode of treating cotton seeds (which have hitherto been wasted to a great extent) for the purpose of and previous to the obtainment of oil therefrom; and consists in destroying, by means of sulphuric acid, the fibre or lint with which the most, if not all, varieties of cotton seed are wrapped or coated to a greater or less extent when they come from the cotton gin, this fibre or lint forming one of the principal obstacles to an easy and profitable extraction of oil from such seeds.

In carrying out this invention, I pour into a vessel of suitable material a quantity of strong sulphuric acid, such as oil of vitriol of commerce, and in this acid I immerse as much cotton seed as the acid will moisten, the seed being stirred or agitated in order the more effectually to moisten it. The quantity of acid employed will depend in a great measure upon the nature of the seed to be treated, and whether the fibre or lint covering the seed is more or less close or dense. This process in a few

minutes will effectually destroy the fibre or lint covering the seed hereinbefore referred to, and at the same time has a tendency to loosen the husk on the kernel of the seed. A fresh supply of seed is then added and mixed with the former seed until all the acid is absorbed. Water is then allowed to flow into the mixture, and a cock at the bottom of the vessel opened, by which the liquid containing the carbonized or decomposed fibres is run or drained off, or the seed may be removed from the liquid by any other convenient arrangement. The seed freed from the fibre or lint is then well washed with fresh water, so as to remove all the acid therefrom. After this process the fibre or lint will be found to be destroyed, whilst the kernels with the husks remain in a clean state. It is requisite that care be taken not to allow the acid to remain too long in contact with the seed, as were that permitted the husk and the kernel would be deteriorated or destroyed. As the success of the process is dependant upon the fact that the acid destroys the fibre or lint in a less time than such acid would destroy the kernel itself, the washing the seed and the removal of the acid should be effected immediately after the destruction of the fibre or lint, or after so much of it is destroyed as is found requisite or desirable. The cleansed and washed seed may then be dried in any suitable and convenient manner, after which it will be fit for market, and may be submitted in a hulled or unhulled state to any of the well-known processes and operations for extracting oil from seed. The dilute acid which is drawn off the seeds may be concentrated by evaporation, and re-used for the same purpose, or may be employed for other useful purposes. The cotton oil cake remaining after the manufacture of the oil is valuable as food for cattle. I may observe that for this purpose nitric acid and chromic acid may also be employed, but I prefer sulphuric acid, although I do not confine or restrict myself thereto.

Having now described and particularly ascertained the nature of the said invention, and the manner in which the same is or may be used or carried into effect, I would observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to; but what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited Letters Patent, is,—

The treatment or preparation of cotton seeds, by means of sulphuric, nitric, or chromic acids, for the purpose of cleansing and preparing the same for manufacture. —In witness, &c.

RUDOLPH SCHRAMM.

Specification of the Patent granted to WILLIAM EDWARD NEWTON, *of* 66, *Chancery Lane, in the County of Middlesex, Civil Engineer, for A New or Improved Process for Obtaining Aluminium.*—Dated July 31, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.— It has hitherto been the practice to effect the reduction of aluminium from its different compounds (single or double chlorides or fluorides) in closed vessels, and in published descriptions on this subject it has been usual to mention the employment of crucibles enclosed in tubes or retorts of fire-clay, coated with alumina. As the employment of these apparatus is attended with disadvantages, the inventors have, in the first place, substituted for such apparatus, vessels made of cast or wrought iron, of varying form, but generally approaching that of crucibles, pots, or seggars, in which vessels the reaction is effected in the same manner as in vessels of clay.

The inventors of the present improvements have also succeeded in effecting the reduction in chambers made of brickwork or fire-clay, which may be either heated in the same manner as a reverberatory furnace or by the transmission of heat through the sides. The apparatus employed by preference, however, is a reverberatory furnace, the bed of which, having a portion of it inclined, is arranged in a suitable manner for facilitating the collection of the metal as it is produced; but the furnaces ordinarily employed for the manufacture of soda may be used for this purpose.

Another improvement consists in modifying the composition of the mixture of matters for effecting the reaction in such a manner as to ensure successful operation, even when operating upon small quantities of materials or with

vessels of small capacity, such as clay retorts or other closed vessels. This is effected by wholly, or to a great extent, dispensing with the marine salt, which is usually added either to the simple chloride of aluminium, the double chloride of aluminium and sodium, or to the fluoride of aluminium and sodium (cryolite), and in simply adding a suitable proportion of fluoride of calcium. The use of marine salt has been hitherto considered necessary for the successful performance of the reduction, and indispensable as a flux for causing the metal to unite; in operating with the double chloride of aluminium and of sodium, it had been pointed out, and always employed in the proportion of fifty per cent. to the double chloride. It has been found by experience that by diminishing this proportion better results are obtained, and that by dispensing with the marine salt altogether the largest quantity of metal is obtained.

The following is the mode of operating according to this improvement when it is required to effect the reduction of the double chloride:—

Take of the double chloride of aluminium and of sodium	100 parts,
Fluoride of calcium	50 parts,
Sodium	20 parts.

(These proportions may, however, be somewhat varied, according to circumstances.) These substances, having been mixed together, are introduced upon the bed of the furnace, previously heated to redness. The fire-bars having been well fed with fuel, the furnace is closed. The reaction will then take place, and by agitating the materials, all the aluminium will be collected in a mass at the inclined part of the bed, and may be run off therefrom. By first pouring off the whitest and most fluid portion of the scoriæ, composed chiefly of the marine salt which has been produced by the reaction, the fluoride of aluminium (which is also an accessory product of the reaction) may also be extracted therefrom. The appearance of the scoriæ remaining is very peculiar after cooling; it is slightly tinged with a colour approaching a yellowish grey. This scoriæ does not contain the finely divided aluminium powder which is met with when the reaction is produced with marine salt; it only contains sometimes globules of aluminium in sufficient quantity to enable it to be collected by pulverizing and washing the mass. When, on the contrary, marine salt is

employed, the mass of scoriæ is of a decided deep grey colour; this colour arises from the aluminium powder mixed with the mass, in which are found only microscopic globules, which are at first difficult to collect and unite by melting.

Having now described the nature of this invention of "A New or Improved Process of Obtaining Aluminium," which has been communicated to me by my foreign correspondents, I would observe that, by means of the above described improvements in the process, the production of aluminium has now been reduced to an essentially practical and commercial form; and in reference to the several peculiarities of the process, I desire it to be understood that under the above in part recited letters patent I claim,—

Firstly, the employment (for the purpose of effecting the reaction) of vessels of wrought or cast iron of large capacity in the form of crucibles or seggars.

Secondly, the employment (for obtaining the reaction) of chambers of brick or fire-clay heated in the interior or at the sides, such as in reverberatory or other furnaces.

Thirdly, I claim the process hereinbefore described, or any mere modification thereof whereby the use of marine salt (chloride of sodium), which has hitherto been added to the aluminiferous matters for the reduction of aluminium, may be dispensed with, or nearly so, by which means a constant and more abundant yield of aluminium may be obtained, together with facility for collecting the metal.——In witness, &c.

William Edward Newton.

Specification of the Patent granted to George Holcroft, *of the City of Manchester, in the County of Lancaster, Consulting Engineer, and* Peter Johnson, *of Wigan, in the same County, Cotton Spinner, for Improvements in the Manufacture of Cement, and in the Application of a known Material to Cementing Purposes.*—Dated July 31, 1856.

To all to whom these presents shall come, &c., &c.—The nature of this invention consists in manufacturing cement of sulphur combined with sand, gypsum, or any

other suitable material; also in the application of sulphur alone for cementing the joints of stones, or as a substitute for cement when used for any other purpose.

In performing our invention we take sand well dried and sifted; we then take the sulphur and make it fluid by applying heat; the sand is then mixed with the sulphur in equal quantities by weight, if a very strong cement is required, but for some purposes seventy-five per cent. of sand may be mixed with twenty-five per cent. of sulphur; or other proportions may be combined according to the purpose for which the cement is required. Instead of mixing the sulphur with sand, as described, it may be mixed with ground coke, pulverized fire or common bricks, gypsum, or any other material possessing the same properties. The cement, thus prepared, may be used in a warm state immediately after the ingredients are combined; or the cement is allowed to cool for the convenience of transport, and heated again when required to be used.

Having thus stated the nature of our invention, and the manner of performing the same, we declare that what we claim is,—

The use and application of sulphur in combination with sand or other ingredients in the manufacture of cement; also the application of sulphur alone for cementing purposes.—In witness, &c.

GEORGE HOLCROFT.
PETER JOHNSON.

Specification of the Patent granted to JULIEN DENIS, *of Queenhithe, in the City of London, for An Improved Gelatinous and Economical Soap.*—Dated July 30, 1856. —(A communication.)

To all to whom these presents shall come, &c., &c.— This new kind of soap is composed of the following ingredients in or about the proportions indicated:—

Best curd or white soap . .	2 lbs.
Pearlash	1 lb.
Quicklime	¼ of a lb.
Chloride of lime in powder .	1-20th of a lb.
Gelatine (osteocolle) . . .	2 ounces.

The above ingredients are mixed together in the following manner:—The curd soap is first cut into thin slices, and thrown into an earthenware or wooden recipient of dimensions sufficient to allow it to contain eleven quarts of the improved gelatinous soap, which, when manufactured, is in the state of a jelly or soft paste, the quicklime is then placed in another recipient, and diluted in about a quart of water.

This being effected, the chloride of lime is likewise diluted in the same proportion of water, and left to settle. After this, the pearlash is placed in a copper or cast-iron vessel, with about seven quarts of water; the said vessel is then put on the fire, and when the pearlash is dissolved, the diluted lime is added, and both left to boil during half an hour; care must be taken to stir frequently the liquid, which, after that time of ebullition, must be poured into another vessel, into which the diluted chloride of lime must also be decanted and mixed with the liquid in the said vessel. The liquid thus prepared is poured upon the slices of soap aforesaid, and on the dregs remaining attached to the bottom of the vessel that contained the liquid are poured about five quarts of boiling water. By agitating frequently the dregs, they melt and form one mass with the water; after allowing the whole mass to repose some time, this liquid is poured upon the soap.

The gelatine (or osteocolle) is then thrown into a quart of boiling water, and when dissolved, thoroughly mixed with the whole mass of ingredients; thus, about 22 lbs. of soap will be obtained. When this soap is used to bleach linen, it should be employed in the following manner:—The linen, according to its fineness or coarseness, is left to soak from six to twelve hours, after which it is wrung and placed in a copper filled with a solution of the soap, of which about 2 lbs. are thrown in for about every two gallons and a-half of water. From twenty-five to forty minutes' boiling are sufficient to cleanse the linen.

Having now duly described and ascertained the nature of the said invention, I claim as novel the mixture of the ingredients herein stated as composing the new gelatinous soap, and likewise the manner herein described of mixing the said ingredients, but I do not limit myself to the exact proportions of the said ingredients.—In witness, &c.

JULIEN DENIS.

Specification of the Patent granted to JULIEN DENIS, *of Queenhithe, in the City of London, for Improvements in Cutting or Perforating Steel and other Metals.*—Dated July 25, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention consists of a certain method for cutting or perforating steel and other metals by mechanical means. By this process the metal is subjected to the action of acids, and the parts of metal that are to be preserved are coated with certain varnishes or protecting wax.

Two kinds of varnishes are used, one of which the inventor denominates protecting varnish, and the other decorating varnish.

The decorating varnish is composed as follows:—

Bitumen . . .	25 parts.	100 parts.
Thick brown varnish .	50 ,,	
Pure spirits of turpentine	15 ,,	
Pure yellow wax . . .	10 ,,	

The composition of the protecting varnish is as follows:—

Thick copal varnish .	90 parts.	100 parts.
Pure yellow wax . .	10 ,,	

The protecting wax is thus composed:—

Pure yellow wax . .	40 parts.	100 parts.
White Burgundy pitch .	50 ,,	
Tallow	10 ,,	

For the perforation or cutting of designs in polished steel plates or other articles of polished steel, a coat of the protecting varnish is first spread over with a brush the bright side of the metal, and on the opposite or rough side the designs to be cut out of the body of the metal are traced with a soft brush previously dipped in the decorating varnish. The designs, however, instead of being traced, may be printed or stencilled with the aforesaid decorating or other suitable varnish or material. It is advisable to give two coatings of the protecting varnish; each coating must be dried separately in an oven kept at a temperature of about fifty degrees Reaumur. When the metal is not in flat plates, and there are angles or edges to be protected, it will then be necessary to protect the said angles or edges with the protecting wax aforementioned, which is kept in a liquid state by warming it over a spirit lamp or

otherwise; the wax is also laid on with a brush. The decorating varnish should be allowed to dry about twelve hours, exposed to a temperature of about thirty degrees Reaumur. For flat metallic plates, it will be advisable to fix them with protecting wax on glass coated with the protecting varnish; the side on which the designs are to be traced is of course placed uppermost. The metallic plate or article being prepared as hereinbefore described, is plunged into a bath of nitric acid diluted at about eight degrees of the acid weigher or acidometer. The side on which the design is figured must be placed downwards. While the plate or article is immersed in the bath, it will be essential to raise at short intervals the said plate or article, so as to allow the bubbles of hydrogen continually forming under it to escape, as otherwise they would prevent the regularity of the perforations in the metal. When the cuttings or perforations are very delicate or minute, certain parts, after having been some time exposed to the action of the acid, may be slightly coated with protecting wax, so as not to be too much eaten away or corroded.

For the perforation of copper, the only differences are that the varnishes should be more completely dried, and the nitric acid diluted at about twenty degrees and mixed with about one-tenth oxalic acid. German silver or metal must be treated in the same manner as copper. For silver, the nitric acid should be at about twenty-five degrees. For zinc, equal proportions of sulphuric and nitric acids diluted at three degrees. For gold, nitro-muriatic acid or chlorine is to be employed.

It is well to observe, that the thinner the metal plates or articles are the clearer will be the perforations, and the more easily will they be effected.

I claim the herein described method of preserving one side of the metal free and clear from roughness, and retaining even its polish, by commencing the perforating or cutting operation at the back of the plate or other particle to be perforated; but I do not limit myself to the employment of the herein described varnishes and protecting wax, as some other substances or compositions may, perhaps, be used with nearly as much or equal advantage; neither do I confine myself to the acids named nor the strengths specified.—In witness, &c.

JULIEN DENIS.

Specification of the Patent granted to THOMAS WRIGLEY, *of Bury, in the County of Lancaster, Paper Manufacturer, for Certain Improvements in Machinery or Apparatus for Cleaning " Cotton Waste " or other Materials used in the Manufacture of Paper.*—Dated July 25, 1856.

To all to whom these presents shall come, &c., &c.—My invention relates to the operations of cleaning cotton waste, &c., before or after washing, for the manufacture of paper, in which the well-known machines called "cone willows" are employed, and by a suitable arrangement and use of these machines I am enabled to open and clean the cotton, &c., in a much more complete and economical manner.

Hitherto the cotton waste, &c., has been submitted to the operation of the willow by introducing it at the narrow or smaller end of the machine, and passing the filamentous flocks immediately through the machine by the rapid revolution of the "spiked cone" with its concentric casing, and turning it out or delivering it from the other end of the machine on to the floor, from whence it had to be carried or removed by hand, and again submitted to the subsequent operation of a similar machine or machines to perfect the cleaning process.

Now my improvements consist in so arranging several "cone willows," and supplying to each at its delivering end a feeding apparatus or cloth, so that the cotton waste, &c., may thereby be introduced into the adjoining consecutive "willow," and so on through any number of willows which may be required by self-acting means. By my improved arrangement the cotton, &c., becomes more attenuated and opened, and consequently more perfectly cleaned, and at the same time a considerable economy of manual labour is effected. The "willows" are so placed or arranged that the delivering or widest end of the one, or first employed, shall be opposite to the narrow or feeding end of the next employed in succession, and so on, the "willows" being placed alternately in a reversed direction, and the cotton, &c., being conveyed from one to the other by means of the traversing, connecting, or feeding cloth. It will be evident that the apparatus used for feeding the said "willows" may be applied in any convenient manner, so as to suit the requirements of machines not situated in the ordinary posi-

tion, as herein described; and also that the fabric employed to transfer the cotton, &c., from one "cone" to another may be composed of cloth, netting, or other approved substitute, and may be caused to move or traverse as an endless band or otherwise as preferred. It will also further be evident that the "willows," (instead of being placed side by side, as hereinbefore described,) may be similarly employed, and placed one above the other, the operation of cleaning the cotton, &c., being the same in principle, but simply varied in its arrangement, and in this method of working the feeding cloth or apparatus (not being necessary) would be dispensed with, or when working side by side, as first above described, the "willows" might be placed so closely together as to dispense with the "feeding cloth" or apparatus if preferred.

Having now described the nature and object of my said invention, together with the manner of performing the same, I would remark, in conclusion, that I claim the novel arrangement and use of "cone willows," as before described, placed consecutively in alternate reversed directions, and so supplied with cotton waste, &c., as to pass the same continuously through the machines until sufficiently opened and cleaned, as hereinbefore described and set forth.—In witness, &c.

THOMAS WRIGLEY.

Specification of the Patent granted to WILLIAM WATT, *of Belfast, in the County of Antrim, in Ireland, for Improvements in the Manufacture of Starch.*—Dated July 15, 1856.

To all to whom these presents shall come, &c., &c.—I take maize or Indian corn, in the whole state, and I steep it in water at a temperature of about one hundred and twenty degrees of Fahrenheit's thermometer, or at any temperature between seventy and one hundred and forty degrees of Fahrenheit's thermometer. The water may be fresh water, or water which has previously been used for the same purpose. The whole or unground corn is thus steeped for about a week, or more or less, and the water is changed several times, or continuous or intermittent streams of water are applied, and the high temperature is

maintained during the steeping. The grains of corn are thus swollen by the combined action of the water and the heat, and a certain amount of acid fermentation takes place, and the extraneous matter of the corn is thus so decomposed and dissolved or acted upon by the steep water as to admit of the particles of starch and the husks being easily separated. The swollen corn is then ground in millstones or otherwise, with a current of water at a temperature of from seventy to one hundred and forty degrees of Fahrenheit's thermometer, or cold water may be employed in the grinding, although with a less beneficial effect. The watery pulp or mixture thus produced, is diluted, if necessary, with more hot or cold water, and it is passed through a sieve or sieves, or strainers, such as are commonly used by starch manufacturers, by which means the husks and fibrous or extraneous matters are arrested while the starch and water pass through the sieves. The starch is separated from the water by allowing it to subside by the ordinary processes and apparatus used by manufacturers of wheat starch or other starch.

A convenient apparatus for this purpose is that which is sometimes called a "run;" it consists of an inclined plane or trough, which may be about eighteen inches wide and seventy feet long, and about five inches deep, and having an inclination or fall of about four or five inches in the seventy feet. These dimensions may, however, be varied. Several of these runs are employed. The starchy water is allowed to flow gently in a thin sheet down this inclined plane or trough. The starch settles upon the plane, while the water and the gluten and fibrous matters pass away at the lower end. When a considerable quantity of starch has collected, the flow is stopped, and the starch is then removed by a shovel and thrown into a cistern, where it is stirred up with water and allowed to subside, and it is then placed in boxes and dried, and packed in paper and stoved in the usual manner. The steeping operation is performed most rapidly and effectively when the water is used at a high temperature, but the temperature must not be so high as to cause the starch granules to burst and dissolve in the water. It is therefore advisable to keep the temperature somewhat below one hundred and forty degrees; and I find that a temperature of one hundred and twenty degrees of Fahrenheit's thermometer, as hereinbefore mentioned, is a convenient

and suitable temperature for the purpose. The water employed in grinding or levigating the steeped corn may be used cold, but I prefer to heat it, as hereinbefore mentioned.

By treating the maize in the whole state at a high temperature, as hereinbefore described, I am enabled to act upon and dissolve the requisite portion of the extraneous matter, and to remove and change the steep water without washing away the starch from the corn; whereas, if the ground or crushed grain were placed in water, a portion of it would be washed away if the water were changed; and on the other hand, if the whole corn were placed in cold water, there would be comparatively but little effect produced, owing to the hard or flinty nature of the maize. The soft condition into which the corn is brought by the use of the hot water in steeping and grinding causes it to yield a larger quantity of a superior quality of starch to that obtained by the ordinary processes. By this process it is unnecessary to employ alkalies or other chemical agents, and the ordinary process of fermenting the grain after crushing or grinding it is dispensed with. The husks and fibrous matters may be employed at once in their moist state for feeding pigs and other animals, and are brought by the aforesaid process into a favourable state for assimilation.

Having now described the nature of the said invention, and in what manner the same is to be performed, I wish it to be understood that

What I claim is,—

The manufacture of starch from maize or Indian corn in the manner hereinbefore described, by steeping the whole or uncrushed corn in water heated to a temperature of from seventy to one hundred and forty degrees of Fahrenheit's thermometer, and then grinding or levigating it with water, either cold, or, by preference, heated to a temperature of from seventy to one hundred and forty degrees of Fahrenheit's thermometer, and then separating the starch, as hereinbefore described; also,

The manufacture of starch from maize or Indian corn in the manner hereinbefore described, by steeping the whole or uncrushed corn in water heated to a temperature of from seventy to one hundred and forty degrees of Fahrenheit's thermometer, such water being changed several times during the steeping, or applied in continuous

or intermittent streams, and then grinding or levigating the swollen corn with water, either cold, or, by preference, heated to a temperature of from seventy to one hundred and forty degrees of Fahrenheit's thermometer, and then separating the starch, as hereinbefore described.—In witness, &c.

WILLIAM WATT.

Specification of the Patent granted to WILLIAM PETRIE, *of Woolwich, in the County of Kent, Civil Engineer, for A New Porous Material for Filters and other like Articles, and for certain Modifications or Improvements in the Manufacture of the Material, whereby it is adapted to the Formation of Vessels of Capacity, to be employed as a Cement, as a Water and Acid-proof Lining, as a Preservative Coating, and as a Substitute for Stone and Earthenware.*—Dated July 12, 1856.

To all to whom these presents shall come, &c., &c.—For filters and porous articles I take silicious sand, having its grains of as nearly as may be an uniform size, fine or coarse, according to the purpose intended. This sand is well dried by heat, and mixed with about a quarter of its weight of powdered sulphur. I rub and stir this mixture in a shallow iron or other suitable dish, heated by a fire beneath to such a temperature as will nearly cause the sulphur to ignite, and when the ingredients are thoroughly intermixed, and become of a consistence like damp sand, I push the mixture off into a similar dish adjoining, kept at a lower temperature, but sufficiently hot to preserve well the allotropic or brown and viscuous state of the sulphur (which ceases at a lower temperature before it finally solidifies), and in which also it is rubbed and stirred. The mixture thus treated is thence thrown in a mass on or into a mould of the desired shape (made of cast iron, or lead, or loam, &c.), and quickly pressed into shape by a light rammer, or by forcing another part of the mould upon or against the first part, as is well understood in similar arts; cold water is then immediately thrown over the moulded material while still in the mould, so as to sink

through its pores. Care must be taken not to apply the water too freely at first, or the material might be blown up by an excess of steam formed in its interior. I form holes or apertures in the under side of the mould to allow the water to percolate.

Instead of applying cold water, another plan is to cast the substance with "a tail" beneath, of the same or similar material, into which the surplus sulphur may settle, and which can be cut off afterwards. This plan is more applicable to articles of some forms rather than others; it secures freer porosity, and when the material is of fine texture, this plan is the more desirable. The degree of porosity is best regulated by the fineness of the grain of the sand. It may also be regulated by the quantity of sulphur used, and by the time the mixture is kept in a heated state.

In place of sulphur in the above described processes, I sometimes use what I call compound sulphur, which I form by taking clay (white China clay being preferred), which I first dry at a temperature just not so high as to hinder the thorough pulverization of the clay, which is next pulverized. I then bake this clay powder at such a temperature as to render it anhydrous, and incorporate and thoroughly stir and melt it with powdered sulphur, in such proportions as to make a sufficiently liquid mass for the intended purpose. Instead of clay, I use in some cases an impalpable powder of silicious or hard carbonaceous matter, or I mix these with the clay, and I do not limit myself to the use of these materials only in forming the compound sulphur.

The composition, whether it be the porous material or the compound sulphur alone, or the solid material hereinafter described, is improved, for many purposes, by the addition of a small proportion (preferably the twentieth, or between one per cent. and ten per cent.), of resinous matter, as pitch, wax, gutta percha, or shell-lac, which should be first thoroughly incorporated with the sand or powder at a temperature which will secure the fusion of the former constituent, and by adding the sulphur afterwards; but the temperature must never be raised so high as to decompose the materials used.

For solid material, proof against water and sulphuric and nitric acids, &c., the sand used has its grains of mixed sizes, from the finest powder (or powder nearly as fine as

the largest grains in the compound sulphur, when this is employed), up to such a size of sand, or pebbles, or stones, as the degree of intended coarseness of the article may allow; but I consider it preferable to have the largest pieces of material only about one-eighth of the thickness of the mass when manufactured.

This variety of sizes (when the grains of each size exist in about such proportions as will fill all the interstices of their own size between the larger grains) increases the strength and efficiency of the material, and economizes the sulphur, besides diminishing any exhalation of sulphur from warmth when the article is in use, and giving it a somewhat better resistance to destruction by heat. Similar advantages attend the use of the compound sulphur, instead of plain sulphur, in forming either the porous or the solid material.

The solid matter, in grains of these various sizes, is put into a pot, preferably of iron, and heated nearly to the degree of ignition of sulphur. And in cases when it is intended to mix with it the aforesaid resinous matter, the mass must first be allowed to cool sufficiently, and then be mixed as aforesaid, the previous heating being beneficial. It is then incorporated by continued stirring with plain, or preferably with the compound sulphur, in such proportion as will render it just sufficiently liquid (to cast in the mould, or to use in the other ways to be mentioned), when it has cooled down to the temperature of greatest fluidity of sulphur.

There are several advantages in heating the composition in process of manufacture to the degree above stated, and it should be kept well stirred while being used; and the moulds should be so constructed that the composition can be pressed into them in as viscuous a state as may be, when the form does not necessitate the use of a fluid composition which needs more sulphur. And the casting, especially in the latter case, should be made with "a head," in which any surplus sulphur will collect as the material cools, and the sulphur acquires its most liquid state just previously to its finally solidifying. I thus make chemical apparatus, as vessels, pipes, and shoots or troughs of it; for which purpose it possesses the peculiar advantage that it may be joined, repaired, or altered, at any time, and in any required manner, by means of hot irons of suitable shapes; I make also drain pipes, roofing tiles, tombstones,

paving stones, porous or not, and blocks for architectural purposes, hollow or solid, and ornamented or plain, which are unaffected by chemical or atmospheric agencies, and almost any kind of vessel or other article for which stone, or stoneware, or earthenware is used; and by properly adapting the size and character of its grains, I make very cheap and useful grindstones, &c.

I use this composition also as a cement for building and for fastening metal work into stone, and for all similar purposes, and for coating metal, wood, and stone, which for this purpose should be rough and warmed; also for lining tanks, &c., and for forming the surface of paths and roads, porous or not, and roofs and other similar purposes. In these cases the articles may be dipped into the melted composition, or it may be poured and spread upon them. The articles manufactured, or the composition employed, may be afterwards trimmed, or brought into more perfect shape by the use of a rasp or hot iron, combined or not with scraping off or smoothing down, and pressing into shape the portions softened by the hot iron.

I do not confine myself to the use of silicious or hard carbonaceous matter where these are named as forming part of the above compositions for mixing with sulphur or compound sulphur, though I prefer them especially for chemical purposes, but I use any other sufficiently infusible and unchangeable material that may be convenient in each particular case, such as granite, porphyry, or other stones. Little care is needed in the selection of the stones when employed in forming concrete and for hydraulic works.

And having now described the nature of my said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the formation of porous material from a composition of sulphur, or the compound sulphur described herein, with grains of other suitable matter, such as is herein described.

Second, the casting of such porous materials "with a tail," the cooling of the same in moulds, and the employment of perforated moulds, as described.

Third, the formation of articles, such as vessels, pipes, tiles, blocks, slabs, and ornaments, by casting or pressing into moulds a composition of sulphur with grains of other matter, porous or not.

Fourth, the casting the said non-porous composition "with a head," as described.

Fifth, the improvement of such composition by the intermixture of all sized grains of material, as described.

Sixth, the employment of the compound sulphur herein described, instead of plain sulphur, for combining with grains of other material to form a composition.

Seventh, the employment of the said compound sulphur alone, to form non-porous materials or articles; and

Eighth, the employment of any and all of these improved compositions of sulphur as a cement, as, for example, for hydraulic works and other building purposes, for fastening one article into another, as of wood, metal, or stone, as iron rails into stone blocks, and for coating or lining other articles or materials therewith.—In witness, &c.

WILLIAM PETRIE.

Specification of the Patent granted to EDWARD HENRY CRADOCK MONCKTON, *of the Parthenon Club, Regent-street, in the County of Middlesex, for The Application of a Means or Process for Destroying Grubs and other Insects, or Animalculæ or Infusoria, injurious to Plants.* —Dated July 11, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in the destruction of grubs and other insects, animalculæ or infusoria, injurious to vegetation, by the application of carbonic acid gas or chlorine gas. As the gas is generated I provide a suitable escape, whereby it is emitted and poured over the surface of the ground around the plants. The supply is maintained until a sufficient height of gas above the ground is obtained to envelop or cover the insects or animal life; either of these gases, being destructive to animal life, speedily destroys all trace of it. For the purpose I prefer carbonic acid gas, as it is otherwise beneficial to the growth of plants, and will therefore be of additional advantage; it is at the same time easily generated by applying sulphuric acid or other suitable cheap acid to chalk or other suitable substances.

This gas I either produce in a close vessel and convey it into a receiver in which it is stored at a pressure for subsequent use, or it may be conveyed at once from the

generator (which is otherwise closed) by a suitable pipe to the surface of the ground and around the plants.

For the purpose I provide a suitable carriage or support for the generating apparatus which travels over the ground on which the gas is to be applied; this carriage should be supplied with the supply of chalk and acid, so that fresh supplies may be introduced into the generator as soon as the previous charge becomes exhausted. The acid should be introduced gradually amongst the chalk to keep up a uniform supply of the gas as near as possible; an agitator may also be used to stir up the chalk, all as well understood in generating this gas for various other purposes.

The generator and materials may be wheeled from place to place, and the gas distributed over the field or garden by a flexible pipe; or the travelling of the carriage may be continuous, and have a suitable pipe depending from it to conduct the gas to the ground during the travelling of the carriage.

When the gas is made at a station and stored in a receiver for use, it may be conducted thence by a suitable pipe or pipes, or the receiver may be placed on the carriage and carried over the ground, the escape of the gas in either case being regulated by suitable stop-cocks to limit the escape and supply it in proper quantity for the purpose. The gas may be similarly applied in a greenhouse or other enclosed space, distributing and supplying it where most required for the destruction of grubs, insects, or infusoria. In applying the gas in a garden or field I prefer to do so on a calm day, as less disturbing action is likely to arise from the atmosphere.

Other gases destructive to animal life may be adopted for the purpose, which are at the same time heavier than common air, and afford other facilities for their application.

Having described the nature of my invention, and the manner in which the same may be performed, I desire it to be understood that what I claim as my invention, to be secured to me by the hereinbefore in part recited letters patent, is, the application of carbonic acid gas and other suitable gases for the purposes and in the manner hereinbefore described.—In witness, &c.

EDWARD HENRY CRADOCK MONCKTON.

Specification of the Patent granted to James Horsfall, *of Birmingham, in the County of Warwick, Manufacturer, for An Improvement or Improvements in the Manufacture of Wire for Pianofortes and other Musical Instruments.*—Dated May 18, 1854.

To all to whom these presents shall come, &c., &c.—My invention consists in hardening, tempering, and drawing steel wire for pianofortes and other musical instruments in the following manner:—

After the wire has been drawn by the usual process to nearly the diameter which it is intended the finished wire shall have, I subject the said wire to the following treatment:—I heat the said wire to redness, and immerse it when so heated in water or oil; by this treatment the wire is made hard. I afterwards plunge the said hardened wire into a bath of melted lead, or other bath having about the temperature of the melting point of lead; I allow the said wire to remain in the said bath until it has acquired the desired temper. The length of time will vary with the size of the wire. After this hardening and tempering process, the wire is submitted to a final drawing, by which it is reduced to the proper size.

Although I have described the method of hardening and tempering, which I have found in practice to answer very well, yet I do not limit myself thereto, as other methods of hardening and tempering may be resorted to; and although I prefer to harden and temper the wire immediately before the final drawing, as herein described, yet the said hardening and tempering may be effected at any stage of the drawing process prior to the final drawing. By the treatment described, the wire acquires a hardness and tenacity, which admirably fit it for pianofortes and other musical instruments.

I claim as my invention, hardening and tempering steel wire for pianofortes and other musical instruments previous to the final drawing, by which the wire is reduced to the proper diameter as herein described.—In witness, &c.

James Horsfall.

Specification of the Patent granted to James Horsfall, *of Birmingham, in the County of Warwick, Manufacturer, for An Improvement or Improvements in the Manufacture of Wire Rope.*—Dated July 7, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in the manufacture of wire rope from steel wire, which has been hardened and tempered, as hereinafter described.

In carrying my invention into effect I harden steel wire by first heating it to redness, and then suddenly cooling it; I then reduce the hardened wire to the requisite temper by exposing it to the heat necessary to effect the desired tempering; the said tempering may be effected by immersing the hardened wire in a bath of melted lead, or by exposure of the said wire to the requisite temperature in any other convenient manner. Both the hardening and tempering of the wire may be effected by any of the well-known and commonly practised processes for hardening and tempering steel. The hardening and tempering of the wire may either be effected before or after the final drawing of the said wire.

In making the said hardened and tempered steel wire into rope the said wire may either be used alone or combined with fibrous material, and the twisting or combining of the wires into rope may be effected by any of the processes which are or may be employed for the manufacture of wire rope. Wire rope made of steel wire, hardened and tempered according to my invention, is stronger than wire rope of the same size made from wire of the ordinary manufacture.

Having now described the nature of my said invention, and the manner of carrying the same into effect, I wish it to be understood that I do not limit myself to the precise details herein described, as the same may be varied without departing from the nature of my said invention; but I claim as my invention the improvement or improvements in the manufacture of wire rope, hereinbefore described, that is to say, manufacturing wire rope wholly or partially of hardened and tempered steel wire.—In witness, &c.

James Horsfall.

Specification of the Patent granted to WILLIAM SMITH, *of Aston, near Birmingham, in the County of Warwick, Manufacturer, for Improvements in the Manufacture of Steel Wire for Musical Instruments, Sewing Needles, and other Purposes.*—Dated July 18, 1855.

To all to whom these presents shall come, &c., &c.—In the manufacture of steel wire for various purposes, it is well known that the repeated drawing to reduce it to the desired size has the effect of hardening, and thereby rendering the same brittle, and it becomes necessary to resort to heating the wire to redness to anneal it during the drawing processes. By means generally adopted, the wire to be annealed is placed in a mass formed of layers or coils, with one layer or coil lying close upon another in the annealing pot or furnace till it is heated to redness, and it is often several hours before the desired redness to such mass is fully obtained. Now, I have discovered that wire when expanded by heat is very susceptible of injury, by imbibing the gases generated in the heating furnace, and that the injury is increased by the time of exposure. And my improvement relates to so conducting the annealing process, that whilst I obtain the redness desired to the wire, the time during which the wire is retained at such temperature, and consequently subjected to the injurious influence of the gases generated in the heating furnace, is materially lessened, by which the wire obtained is found to be of a superior character.

But that the nature of my said invention and the means which I adopt may be fully understood, I will proceed to explain the means pursued by me. In annealing the wire, I pass it in a string through the furnace and in direct contact with the heat evolved therefrom, allowing it only to remain there sufficiently long to obtain the heat desired; and for this purpose the furnace is provided with a hole or holes sufficiently large to admit of the passage of the wire into and from it, and, by preference, I cause the string of wire to pass round a pulley within the furnace, and on the opposite side to that at which it enters, by which arrangement it may, if desired, be readily drawn from the furnace at or near the same point as that at which it enters; but I

do not confine myself to this arrangement. The plan which I ordinarily adopt is the following:—

I first place the wire to be annealed upon a reel or pulley, from which it passes through a hole in the furnace sufficiently large to admit of the passage of a small shaft or rod, to which the end of the wire is attached. This rod is introduced to the pot or furnace through an opening for that purpose on the opposite side thereof to that by which the wire enters, or at such other position which may be found more convenient, and by it the workman is enabled to draw that end of the wire into the pot or furnace to conduct it round the pulley referred to, and thence to the exit aperture, when the end of the wire will be disconnected from this conducting shaft or rod, and the wire will then be drawn away from the pot or furnace as desired. The time occupied in obtaining the desired heat will vary with the diameter of the wire or the heat of the furnace, but ordinarily it will not exceed a few seconds. And in order to temper the wire as required for the purpose to which it is to be applied, I conduct it as it comes from the heating furnace, and whilst in a state of red heat, into a chamber largely charged with oxygen gas, which may be obtained by the application thereto of oxide of manganese, through which the wire will be drawn, or by passing therethrough currents of cold air. By thus tempering the wire, the surface becomes more compact and less liable to injury during the subsequent drawings, whilst the tenacity of the central portion is improved by the protection afforded from the surface. I prefer to effect these processes previous to the final drawing.

Having thus described the nature of my said invention, and the means which I adopt in carrying the same into practice, I would have it understood that I do not confine myself to the precise details herein referred to, so long as the peculiar character of the invention be retained.

But what I do claim is,—

The method of operating in the manufacture of steel wire for musical instruments, sewing needles, and other purposes, substantially as herein explained.—In witness, &c.

William Smith.

Specification of the Patent granted to JOHN JAMES RUSSELL, *of Wednesbury, Patent Tube Manufacturer, and* JOSEPH BENNETT HOWELL, *of Sheffield, Steel Manufacturer, for Improvements in the Manufacture of Cast Steel Tubes.*—Dated September 25, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in making tubes from sheets or strips of cast steel previously rolled or formed to the thickness and sizes desired. To make lap-jointed tubes of cast steel we take a strip of cast steel of the required dimensions and bevel or scarf the edges to form the joint, then bend it into the shape of a tube, with the edges overlapping each other, as when making lap-welded iron tubes.

The steel skelp or tube thus prepared is then placed in a furnace, and when heated to the proper or welding heat it is passed between rollers over a mandril so as to unite or weld the bevelled edges together, and thus form a cast steel tube, which is then finished by being passed between rollers or drawn through holes or dies to reduce it to its proper size.

To make a butt-jointed tube we take a strip of cast steel of the required dimensions and bend it so as to bring the edges together or nearly so. It is then placed in a furnace, and when at a welding heat it is passed between rollers (either without or over a mandril) or drawn through holes or dies, by which means the edges are passed together and thus produce a perfect cast steel butt-jointed tube. In order to insure good welds to butt-joints we pass a cutting or scraping tool between the edges of the strip before the welding is effected, so as to clean the edges from dirt or other matter, and thus permit them when pressed together in the welding process to touch and meet in every part, by which means a much firmer weld will be effected; and after heating the so prepared turned-up strip in a furnace to a welding heat, passing them through dies or holes, or between rollers over a mandril whereby a more perfect tube will be obtained.

We would remark that we are aware that it has before been proposed to make cast steel tubes by casting hollow ingots or by drilling solid ingots of cast steel, and then

extending the same in length by means of rollers or dies; we do not, therefore, claim generally to manufacture cast steel tubes.

But what we claim is, the manufacture of cast steel tubes by welding the edges of sheets or strips by the aid of rollers and dies substantially as herein described.—In witness, &c.

JOHN JAMES RUSSELL.
JOSEPH BENNETT HOWELL.

Specification of the Patent granted to EDWARD DAVIES *and* JOHN MILNE SYERS, *both of Liverpool, in the County of Lancaster, and* CHARLES HUMFREY, *of Camberwell, in the County of Surrey, Merchants, for Improvements in Distilling Resinous, Bituminous, Fatty, and Oily Matters, and in the Treatment of certain Products therefrom.*—Dated December 18, 1855.

To all to whom these presents shall come, &c., &c.—Our improvements in distillation are as follows:—In distilling resinous, bituminous, oily, and fatty matters, it is desirable to obtain, first, a means of easily regulating the heat in the still, raising it or lowering it at pleasure; and, secondly, the separation of the still and its inflammable contents from the furnace required to heat them. Now, we propose to attain these objects by the following contrivance:—The still is one of the ordinary form, into the bottom of which we introduce a coil of iron or copper pipe, entering at the side and passing out at the centre of the bottom or otherwise, as may be found most convenient.

The furnace, placed at a lower level and at some distance from the still, has also a coil of pipe placed in it. The two ends of the two coils are connected, and the tube filled with some fluid or substance capable of sustaining a high degree of heat. For this purpose we prefer to use fusible metal, which, being heated in the furnace, will circulate rapidly through the two coils of pipes, and transfer to the charge in the still any required degree of heat.

Should it be inconvenient to arrange the furnace in which the coil of pipe is heated at a lower level than the still, the circulation of the heated metal or other heating medium

can be effected by introducing into the pipe connecting the two coils a spiral fanner, and this being made to rotate by any convenient machinery will cause the heated metal to circulate through the apparatus, and by adjusting the speed of this fanner the heat transferred from the furnace to the still can be adjusted. If fusible metal is used as the heating medium it will be requisite to have the facility of emptying the coil when the still is out of action, and filling it again when required for use, but this is so easily done that we do not consider it requisite to specify any particular mode of doing it. The flow of the heating medium can be regulated by a stop-cock or valve.

We will now proceed to describe the methods we employ to free paraffine from oil and colouring matter. We first subject the rough paraffine to pressure in an ordinary hydraulic or other press, by which means the greater portion of the oil will be separated from it; we then boil the pressed cakes with free steam, and towards the close of the operation add about one per cent. of their weight of ordinary sulphuric acid, and continue the ebullition a short time. This will throw down all the dirt and mechanical impurities; and as soon as these have settled, we draw off the paraffine into any convenient vessel, and add to it about one-fourth of its weight of naphtha, and stir them well together. This vessel should be covered closely to avoid the loss of naphtha. When this mixed paraffine and naphtha has cooled down to about one hundred and thirty degrees Fahrenheit, we draw it off into tins, such as those used in the stearine manufacture, and allow it to cool. We press the cakes thus obtained between coir mats or otherwise, as in pressing stearine, when the naphtha runs out freely, carrying with it the oil and pitch with which the paraffine was contaminated. By repeating the process and using fresh naphtha, the paraffine can be obtained of perfect whiteness, and we find that even the darker samples of Irish and Prussian paraffine can be made white by three such operations. The naphtha used in the third operation will be scarcely discoloured, and will serve for the second, and that used in the second for the first, but it will then have become so charged with oil and pitch as to be unfit for further use, and must be returned into the still and worked over again; thus no loss will arise. The paraffine from the last pressing will always retain a slight trace of naphtha, from which it can be easily freed, by heating it to about

two hundred and fifty degrees Fahrenheit, and blowing steam through it. In thus purifying paraffine we prefer to use the naphtha that has been obtained in distilling the paraffine itself; thus, the naphtha obtained from Rangoon tar is the best to refine the paraffine obtained from that same material, as when it becomes charged with oil and pitch it can very conveniently be returned into the still and worked over again. This, however, is not essential, and any naphtha or other spirit can be used to refine any paraffine. We find rosin spirit very well adapted to this purpose.

Having now described the nature of our said invention, and the manner in which the same is to be performed, we hereby declare that we do not confine ourselves to the precise details, nor to the exact materials used; but we claim as the invention intended to be secured by the said Letters Patent, the distilling resinous, bituminous, fatty, and oily matters, and the purification of paraffine, as above described.—In witness, &c.

EDWARD DAVIES.
JOHN MILNE SYERS.
CHARLES HUMFREY.

Specification of the Patent granted to ARTHUR ALLRIGHT, *of George-street, Edgbaston, in the County of Warwick, for Improvements in the Manufacture of Lucifer Matches and of Boxes suitable for containing the same.*—Dated October 10, 1856.

To all to whom these presents shall come, &c., &c.—The improvements in the manufacture consist in the use of flour paste to cause the materials of which the head of the match is composed to adhere to the splint of wood or raw match. Also in omitting from the composition of which the head of the match is formed, either phosphorus or chlorate of potass, and in afterwards applying to the surface of the heads of matches, according as one or other of the abovenamed substances has been omitted, a thin coating of amorphous phosphorus, which is made to adhere by a suitable cement, or chlorate of potass, by dipping the heads of matches in a solution of that substance. Also in coat-

ing or varnishing the heads of lucifer matches with an aqueous shellac varnish, or with a mixture of white of egg, or blood, with lime or chalk, to which may be added powdered glass, oxide of iron, and other substances. The improvements in the manufacture of boxes suitable for containing lucifer matches consist in coating boxes, made of chip or scaleboard doubled up to form the box, with varnish or composition, to render them waterproof or partially so. The compositions above mentioned for coating the match heads are also very suitable for coating the boxes.

The following is the manner of preparing the lucifer match composition, into which the paste of wheat flour enters, and which I will call

The simple amorphous phosphorus cold composition, meaning by cold, that no heat is required in the operation of dipping the matches in it.

I take of best wheat flour two parts, and of water fourteen parts, and mix them together and boil them into paste. In boiling this mixture into paste it naturally loses some of its water. It is, therefore, needful to take care that it does not become too thick.

I take of this paste	15 parts.	26 to 27½ parts.
Of chlorate of potass in very fine powder	6 "	
Of very finely powdered glass . .	3½ "	
Of powdered amorphous phosphorus	1½ to 2½ "	

After having intimately mixed these materials, I add, if needful, a small quantity of water to reduce the mixture to such a consistency as to make it adhere in suitable quantity to the ends of the splints dipped into it. For a sulphured splint but a small quantity of the composition is needful; for one dipped in stearine, more is required. These matches will maintain a good condition so long as they are kept dry. To harden the composition, to enable it better to resist humidity, I make use of different methods for the preparation of the flour paste, and which I will now describe.

First, to the proportions of flour and water above given, I add one or two per cent. of sulphate of alumina (free of potass) and I allow the materials to repose for half an hour before boiling into a paste. When the paste is made I add a quantity of powdered chalk, equal in weight to that of the sulphate of alumina employed, in order to combine with the acid of the latter; or,

Secondly, I make the flour paste with water, to every

half pint of which the white of one egg of average size has been added; or,

Thirdly, for half the quantity of water required for the paste I substitute an equal volume of fresh uncoagulated blood; or,

Fourthly, if I wish to obtain a very hard composition, I add to the pastes Nos. 2 and 3, one-half per cent. to one per cent. of chalk, and the same quantity of red oxide of iron, and three per cent. or more of a solution of glue,

Consisting of glue . . $\frac{1}{3}$
water . . $\frac{2}{3}$

It is desirable to use the best quality of flour and to pass the paste through a sieve before using it.

I will now describe the mode of preparing the lucifer match, into the first dip of which no phosphorus enters, but the ignition of which is made to depend on there being afterwards attached to it a small portion of that substance.

The following are the methods of preparing the two compositions, which I will call, B preparatory and B final, which together form the lucifer match.

The B preparatory composition I make in mixing together

5 parts of very finely powdered glass.
5 „ sulphuret of iron.
2 „ red oxide of iron.
30 „ chlorate of potass.
15 „ solution of glue (glue one part, water two parts).
—
57, which if too thick may bear dilution with three parts or more of water, which will make sixty parts more of B preparatory composition.

I prefer these materials as perfectly innocuous in case of the matches being accidentally or otherwise swallowed.

The two preparations of iron, forming together seven parts of the above composition, may at pleasure be replaced by five parts of the red sulphuret of antimony, often called crocus of antimony. The composition may also be made somewhat cheaper by omitting the oxide of iron, and replacing five out of the thirty parts of chlorate of potass by ten parts of protoxide of manganese (containing ninety per cent. of peroxide).

Into a preparatory composition, prepared as above described, I dip the sulphured or stearined or otherwise prepared splints in the ordinary manner, the compo-

sition being maintained at the needful state of fluidity by means of heat applied according to any of the usual methods.

The dipping operation may be performed without the smallest apprehension of danger from the use of this composition. The matches dipped in them dry rapidly in their frames, and in order to convert them into lucifer matches, they are coated with the B final composition, of which the following is the composition:—

B Final.

Shellac	7	parts by weight.
Dissolved in spirits of wine or vegetable naphtha . . .	43	"
	50	"
Powdered amorphous phosphorus .	50	"
	100	parts.

Or, in place of the above, may be used,—

No. 2, B Final.

Solution of glue (glue 1, water 2) .	15	parts by weight.
Water	40	"
Amorphous phosphorus . .	20	"
	75	pts., all by weight.

Or No. 3, B Final.

Shellac		17	parts by weight.
Dissolved in water . .	120		
Liquor of ammonia, 880 per cent. specific gravity .	3		
	123	123	"
		140	
The above materials are well mixed, and the shellac is dissolved by means of a gentle heat, and then is added, of very finely powdered glass		20	"
Of amorphous phosphorus . .		50	"
		210	pts., all by weight.

Or No. 4, B Final.

Russian glue	$1\frac{1}{3}$ parts.
Dissolved in water	21 „
Very finely-powdered glass	12 „
Red oxide of iron	4 „
Amorphous phosphorus	7 „
	$45\frac{1}{3}$ parts.

I have employed two methods for giving the dip or coating of final composition to the once dipped matches; the first that of transferring the final composition to the ends of the matches by means of a hollow cylinder of vulcanized india-rubber of about three-quarter inch thickness, its circumference being one-third more than the length of the frames containing the matches, and its length equal to the breadth of the frames; the second, that of dipping a frame filled with the matches into a very thin bed of the final composition. For both these methods I employ a shallow dish three-quarters of an inch deep, and of an area between that of the frame and that part of it which is occupied by the matches placed ready for dipping. The bottom of the dish ought to be perfectly level, and for use to be also placed on an exact level surface. When thus made ready, I introduce the requisite quantity of the final composition.

A larger quantity will be required where the transfer is to be made by means of the india-rubber cylinder than when it is to be made by dipping.

In using the india-rubber cylindrical roller, I revolve it in the final composition, so as to coat therewith two-thirds of its perimeter, and then immediately pass it over the ends of the matches duly fixed in the frame, and I thus communicate to them the coating of final composition in a manner much resembling that by which printers' ink is communicated to the types. It may happen that some of the matches have not been touched, but these should be very few, and this defect I remedy by a morsel of sponge dipped in the composition. The second mode of coating the matches—that of dipping a frame of them into the final composition—requires no description. The only nicety required is not to employ a needless quantity of composition, by having too much in the tin dish.

The above-described method of using amorphous

phosphorus presents the advantage of entirely obviating the danger, (especially when heat is required, as in all glue-made matches,) which may arise from mingling the amorphous phosphorus and the chlorate of potass in one composition. It has also the advantage of great economy in the very small quantity of amorphous phosphorus required by this method to ignite the lucifer match.

The following is my method of preparing lucifer matches from which chlorate of potash is excluded in the first or preparatory composition. The sulphured or stearined or otherwise prepared splints are dipped into a composition formed as follows, which for distinction I will call preparatory composition, C:—

Amorphous phosphorus . .	2 parts.	16 parts.
Powder of pure nitrate of potass .	5 "	
Very finely powdered glass . .	3 "	
Solution of glue (glue 2, water 1)	6 "	

The quantity of amorphous phosphorus may be diminished even to the extent of one-half of it by substituting double or treble its weight of sulphuret of antimony or other metallic sulphuret. This composition requires to be on a heated surface during the operation of dipping the matches. When the matches have become dry, or nearly so, I dip them into a strong or even hot concentrated solution of chlorate of potass in water, which operation may be conducted in a tin dish of the same kind as before described.

As I do not find the matches thus prepared possess uniformly sufficient excitability, I have supplied this defect by redipping the matches which had received a proper quantity of the preparatory composition, C, in the following or final composition, D:—

Chlorate of potass (by weight) .	20 parts.	54 parts.
Very finely powdered glass .	17 "	
Glue solution (glue 1, water 2) .	3 "	
Water	12 "	
Amorphous phosphorus . .	2 "	

It will be seen that phosphorus is not wholly excluded from this composition, but it is so far excluded that were this composition to be used alone for heading matches, the matches so formed would not be practically useful.

I will now describe the second part of my patent, namely, the aqueous shellac varnish and the albuminous mixtures which I employ to coat the ends of the matches, as also the boxes (of chip or scaleboard) for containing the same.

The aqueous shellac varnish I prepare by adding to any given quantity the one-fiftieth part of its weight of strong liquor of ammonia (880 specific gravity), and the tenth to the sixth of its weight of shellac in coarse powder, which must be dissolved in the liquid in a close vessel by the assistance of a gentle heat. For the albuminous mixtures I rub down in a mortar equal parts of chalk and red oxide of iron, adding thereto eight times their united weight of a mixture of white of egg and water, in equal proportions; if, in combination with red oxide of iron, I substitute lime for chalk, I take only half the weight I should have employed of this latter substance. An equal weight of very finely powdered glass may also be substituted to the extent of one-half of the weight of the oxide of iron. Instead of the diluted white of egg an equal quantity of fresh uncoagulated blood may be employed for mixing with the lime, chalk, oxide of iron, and powdered glass in the portions give above.

Either of these varnishes or albuminous mixtures is poured into a shallow tin dish of a suitable shape to admit a frame of matches, which is dipped into the same, so as to allow the fluid to cover completely the inflammable composition of each match, and slightly to adhere to the wood above.

The same varnish and albuminous mixtures may be used for rendering the scaleboard of the boxes in which matches are commonly packed at least partly waterproof, and if an albuminous mixture be first laid on the boxes, then a coating of the shellac varnish to follow will render the effect more complete. The application may be made with a brush or in any convenient manner.

Having thus described the nature of my invention, I would have it understood that I do not confine myself to the exact details, either of proportions of materials used or description of apparatus employed;—

But what I claim is,

First, the use of flour paste to cause the materials of which the head of the match is composed to adhere to the splint of wood or raw match.

Second, the separation of the amorphous phosphorus and chlorate of potass, which form the active ingredients of the lucifer match into two compositions or parts, which are to be applied separately to the sulphured, stearined, or otherwise prepared splint.

Third, the use of an aqueous shellac varnish or a mix-

ture of white of egg, or blood, with lime or chalk for coating lucifer matches; and also the use of the said varnish and albuminous mixtures to coat the boxes of scaleboard employed to hold the lucifer matches.—In witness, &c.

ARTHUR ALLRIGHT.

Specification of the Patent granted to ROBERT WILLIAM SIEVIER, *Sculptor, of Upper Holloway, in the County of Middlesex, in the United Kingdom of Great Britain, but now residing in Bruxelles, in the Kingdom of Belgium, for Improvements in Preserving Wood from Decay and also from Destruction by Insects.*—Dated July 30, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in subjecting timber or wood, when saturated or impregnated with materials or solutions used for preserving such wood or timber, to pressure between rollers, or otherwise, so as to compress the substance thereof and close up the interstícial spaces, by bringing the woody matter into closer contact; the result being that the wood is rendered perfectly impervious to the decaying influence of air or water, and the attacks of insects, while at the same time it is rendered more dense and more durable; and it is also capable of being used in place of the harder and more scarce and costly woods, being, by this process, capable of receiving the highest polish and of resemblance to them in their general properties. I first prepare the wood for pressure by causing the pores to become filled with rosin, tar, pitch, bituminous matters, or any other materials or compounds used for preserving wood, and, if necessary, with colouring matter. I sometimes employ solutions of gelatine, in combination with certain solutions of metallic salts, so arranging the process that their mutual decomposition may take place in the pores of the wood, and solid matter be therein deposited and precipitated; or, I may employ any of the well-known chemical salts or compounds, which will, upon contact or mixture, throw down or deposit solid matter. I also use chemical compounds, such as chloride of mercury, sulphate of copper, sulphate or chloride of zinc, arsenious acid, nitrate of acetate of lead, antimony, or any other suitable salt or poisonous drug, to prepare the wood, prior to its

treatment with any of the substances mentioned (by preference), when it is required to preserve such woods from the action of insects; or I use these salts or materials, in combination with the others named, whenever I desire to do so. If the wood or timber is intended for situations where the "toredo navalis," or any other destructive insects abound, it must be first impregnated with some of the above, or other poisonous substances; and (by preference) when the wood is dry, it is to be impregnated with the bituminous substances, and then subjected to pressure.

I will proceed to explain the methods I find convenient for impregnating the wood with these materials. I first heat the wood in any convenient manner, in order to expel all moisture and air, and then plunge it into a bath of pitch, rosin, bitumen, or any of the solutions named; or pitch, bitumen, rosin, &c., dissolved in any suitable solvent; and I also promote the process of impregnation by means of proper exhausting apparatus communicating with the timber, by means of which the pores of the timber may become exhausted of air, and the materials be driven therein by reason of the pressure of the atmosphere; but any of the well-known methods of saturating or impregnating timber with substances, for its preservation, may be adopted.

The operation of saturating or impregnating being complete, I remove the timber from the bath or vessel, and place it in some convenient situation for draining it and removing all superfluous fluid. I then subject the wood, so saturated, to the pressure of powerful rollers, the surfaces of which may be made to correspond to any suitable shape or design which it may be desired to give to the timber; or, I use any other suitable means of effecting the necessary pressure, and sustaining the same for the necessary period. I thus cause the fibres and cells of the wood to become powerfully compressed, and squeezed closely together in a more compact and reduced mass, which compactness is increased and rendered durable by reason of the resinous, bituminous, or other matter, contained therein; and the pores of the wood being filled and condensed, the timber is thus rendered impervious to water or air, and the attacks of insects. The wood should be passed slowly between rollers, which will shape the wood and squeeze the fibres closer together; it should be gradually pressed into the shape required, in the same manner as the rolling of iron; for instance, a piece of American pine

wood will easily press into half its former bulk, but if the pressure is given at first with too great a force, the fibre of the wood is to a certain extent destroyed, and its strength injured. I pass it several times between the rollers, slowly; each time increasing the pressure, this gives the fibres of the wood time to arrange themselves without being injured by fracture. The wood should be sawn a little into the form intended to be rolled; for instance, suppose I wish to make that part of a sash-window-frame which holds the glass, the sectional form of the wood should be a sort of lozenge, so that the rollers may more easily press it into the shape intended. The same must be done with the wood intended for girders or any large pieces of timber. Should the timber require bending, the machines in use might be so modified as to bend and compress at one operation. When planks are required of compressed wood, the timber may be sawn into planks before or after compression, but it is preferable to compress the wood after being sawn into planks. The same with regard to veneers, which are produced by this invention of great utility and value. Wood, when coloured or stained, and impregnated as described, possesses, after compression and subsequent finish, a very compact and beautiful appearance, which renders it extremely serviceable in ornamental or cabinet work, and for tesselated wood floorings.

I am aware that wood has been impregnated with the bodies or materials herein named, in order to render it more durable and capable of resisting decay, and the attacks of insects; the process has been applied to railway sleepers and to other purposes, and the wood or timber, after being treated according to my invention, is still better applicable to railway sleepers, to timber for the construction of bridges, viaducts, breakwaters, ships, and other objects, where strength and durability are desiderata.

I claim the pressing or squeezing timber or wood by rollers, or by any other suitable means, such timber or wood being previously saturated, according to the well-known methods, with materials for the purpose of preserving the same, by which compression I effect its greater durability, rendering it less subject to decay, and to destruction from the attacks of insects, besides increasing its value generally in so far as regards its application to various useful purposes, as herein described.—In witness, &c.

ROBERT WILLIAM SIEVIER.

PATENTS SEALED TO MARCH 24, 1857.

February 27, 1857.

1997. Thomas Lees, of Stockport, for lubricating parts of steam-engines, and apparatus and machinery to be applied for that purpose.—Dated August 27, 1856.

2023. John Gregory, of Nelson-square, for a fish joint or method of connecting rails.—Dated August 30, 1856.

2029. Richard Hill Norris, M.D., of Birmingham, for improvements in photography, by the use of collodion in a dry condition, and for a means of transferring photographic films.—Dated September 1, 1856.

2039. George Cumming Thomas, of Gracechurch-street, for a method of making steel.—Dated September 3, 1856.—(A communication.)

2041. Jean Baptiste Marcelin Jobard, à Bruxelles, for the manufacture of lamps.—Dated September 3, 1856.

2044. Louis Cornides, of Trafalgar-square, Charing-cross, for dressing or preparing hides, skins, intestines, and such like animal substances.—Dated September 3, 1856.

2053. Joel Tanner Hart, of Gracechurch-street, for apparatus for modelling statuary from life, and for measuring and copying statuary and other uneven surfaces.—Dated September 4, 1856.

2064. John Benjamin Dancer, of Manchester, for photographic cameras and in the apparatus connected therewith.—Dated September 5, 1856.

2083. Peter Armand le Comte de Fontainemoreau, of Paris, and South-street, Finsbury, for making artificial stone for statues and ornamenting purposes.—Dated September 6, 1856.—(A communication.)

2093. Francis Mitchell Herring, of Basinghall-street, for applying magnetic action to combs and brushes.—Dated September 8, 1856.

2100. William Gossage, of Widnes, for the manufacture of certain kinds of soap.—Dated September 9, 1856.

2142. Edward Green, of Wakefield, for scrapers employed to cleanse boiler tubes and flues for economizing fuel.—Dated September 13, 1856.

2166. Richard Archibald Brooman, of Fleet-street, for water-closets and night-stools.—Dated September 16, 1856.—(A communication.)

2177. William Frederick Spittle, of Birmingham, for a spindle for braiding and plaiting machines.—Dated September 17, 1856.

2225. John George Taylor, of Glasgow, for fastenings, connectors, and couplings, and in the application thereof.—Dated September 23, 1856.

2328. Alfred Vincent Newton, of Chancery-lane, for supplying steam-boilers with water.—Dated October 4, 1856.—(A communication.)

2343. James Hinks, of Birmingham, for a new manufacture of metal boxes.—Dated October 7, 1856.

2350. William Ward, of Warrington, for an improved manufacture of woven fabric.—Dated October 8, 1856.

2422. John Green, of Charlotte-street, Portland-place, for a cooking apparatus.—Dated October 17, 1856.

2476. William Edward Newton, of Chancery-lane, for machinery for rolling and forging iron or steel.—Dated October 21, 1856.—(A communication.)

2797. John Marshall, jun., of Selby, for purifying of oils and fatty matters.—Dated November 25, 1856.

2941. George Collier, of Halifax, for machinery or apparatus for the manufacture of piled fabrics.—Dated December 11, 1856.

2977. Edwin Heywood, of Sutton Cross Hills, Leeds, for machinery or apparatus used in weaving.—Dated December 16, 1856.

3056. Jules Henry Etienne Mareschal, of Paris, for hydraulic presses.—Dated December 24, 1856.

3103. Charles Wye Williams, of Liverpool, for apparatus for mechanically charging furnaces with fuel.—Dated December 31, 1856.

46. Thomas Holmes, of Pendleton, for the prevention or consumption of smoke in furnaces and fire-places.—Dated January 6, 1857.

March 3, 1857.

2054. Evan Leigh and George Peter Leigh, of Manchester, for parts of machinery or apparatus used in preparing and spinning cotton and other fibrous substances.—Dated September 4, 1856.

2059. John Montagu Hayes, of Southsea, for the construction of cartridges for fire-arms.—Dated September 4, 1856.

2061. John Loude Tabberner, of Trafalgar-square, Charing-cross, for smelting ores.—Dated September 4, 1856.

2066. John Johnson, of Single-street, Mile-end, for railway carriages.—Dated September 5, 1856.

2072. John Johnston, of Trafalgar-square, Charing-cross, for photographic plates.—Dated September 5, 1856.—(A communication.)

2088. Adolphe Gilbert Chalus, of Paris, and of Essex-street, Strand, for stopping bottles and other vessels.—Dated September 8, 1856.

2092. Boniface Sabatier, of Paris, and of Trafalgar-square, Charing-cross, for photography.—Dated September 8, 1856.

2095. William Petrie, of Woolwich, for the manufacture of sulphuric acid and the apparatus employed therein, parts of which improvements are applicable to the manufacture of nitric, hydrochloric, and other acids.—Dated September 8, 1856.

2106. Henry Cooke, of Manchester, for dyeing yarns or threads.—Dated September 10, 1856.

2122. John Gedge, of Wellington-street South, Strand, for paint or colouring matter, applicable to coating metals and other substances, whereby the oxidation of metal is prevented, and resistance to the action of the atmosphere, rays of heat, or acids is secured.—Dated September 11, 1856.—(A communication.)

2126. John Milnes and William Thompson, of Sutton Mill, Kildwick, for looms for weaving.—Dated September 11, 1856.

2147. Frederic Ducimetiere-Monod, of Marseille, for the manufacture of chlorine.—Dated September 13, 1856.

2159. Stanislas Chodzko, of Paris, for the manufacture of manure, and the apparatus employed therein.—Dated September 15, 1856.

2253. Samuel Calley, of Brixham, for a composition and compositions for coating or covering surfaces, particularly the bottoms of ships and vessels.—Dated September 25, 1856.

2258. William Horsfall, of Manchester, for cards for carding fibrous substances.—Dated September 26, 1856.

2555. Louis Urion, of Nancy, France, for match-boxes or holders.—Dated October 30, 1856.

2590. William Edward Newton, of Chancery-lane, for riming and tapping gas fittings.—Dated November 4, 1856.—(A communication.)

2594. Louis Urion, of Nancy, France, for machinery for the manufacture of matches and match-boxes.—Dated November 5, 1856.

2785. Charles John Lewsey, of Albion-terrace, Commercial-road East, for improvements in sugar cane mills.—Dated November 24, 1856.

2798. Alfred Vincent Newton, of Chancery-lane, for machinery for forging iron.—Dated November 25, 1856.—(A communication.)

March 6, 1857.

2085. Paul Rapsey Hodge, of Albion-grove, Islington, for grinding wheat and other farinaceous grains, and in the treatment of the products therefrom.—Dated September 6, 1856.

2087. Felix Estivant, of Paris, and of Essex-street, Strand, London, for casting metal tubes.—Dated September 8, 1856.

2103. George Tomlinson Bousfield, of Sussex-place, Loughborough-road, Brixton, for flying or roving frames.—Dated September 9, 1856.—(A communication.)

2105. William Smith, of Salisbury-street, Adelphi, for a powerful compound whistle.—Dated September 9, 1856.—(A communication.)

2113. John Taylor, of Spring-grove, Hounslow, for building walls.—Dated September 10, 1856.

2128. John Talbot Pitman, of Gracechurch-street, London, for the construction of iron bridges.—Dated September 11, 1856.—(A communication.)

2130. Albert Demerit Bishop, of Hanover-house, Maryon-road, Charlton, for derricks for raising sunken ships and other heavy bodies from below water, and moving heavy bodies from one place to another.—Dated September 11, 1856.

2160. Robert Elmy Garrood, of Chelmsford, for stopcocks and valves for the drawing off and passage of air, gas, steam, water, and other fluids, or for any other purpose for which the same may be applicable.—Dated September 16, 1856.

2202. William Young, of Queen-street, Cheapside, for furnaces, fire-places, and stoves.—Dated September 19, 1856.

2388. Alfred Vincent Newton, of Chancery-lane, for a new gaseous liquid to be used in generating motive power.—Dated October 11, 1856.—(A communication.)

2582. William King Westly, of Leeds, for an improved method of and machinery for heckling, combing, drawing, and preparing fibrous substances for spinning.—Dated November 3, 1856.

2814. Peter Walker, of Warrington, for brewing and in machinery or apparatus employed therein.—Dated November 28, 1856.

2974. Alfred Vincent Newton, of Chancery-lane, for machinery for boring, turning, tapping, and screwing fittings for gas, water,

steam, and other pipes, and in vices for holding the same while they are operated upon.—Dated December 15, 1856.—(A communication.)

3005. WARREN A. SIMONDS, of Boston, U. S. A., for an improved life-preserving float.—Dated December 18, 1856.

40. DAVID BAKER, of the Gisborough Alum Works, Yorkshire, for the manufacture of paper.—Dated January 5, 1857.

March 10, 1857.

2123. JAMES HUDSON, of Halifax, for whetting or setting "printer's doctors," and other straight-edged tools or instruments.—Dated September 11, 1856.

2129. ALEXANDER CHAPLIN, of Glasgow, for improvements in ships or vessels.—Dated September 11, 1856.

2140. JOHN ELLIOTT, of Southampton, for an apparatus for containing and supplying water, gas, and other fluids; applicable also as a fluid meter.—Dated September 12, 1856.

2143. WILLIAM WHITTLE, of Smethwick, for machinery for the manufacture of nails.—Dated September 13, 1856.

2150. SAMUEL CUNLIFFE LISTER, of Manningham, near Bradford, for preparing and spinning cotton, flax, and similar fibres.—Dated September 13, 1856.

2154. JEAN BAPTISTE JUSTIN LASSIE, of Paris, and of South-street, Finsbury, London, for a new system of aërial navigation.—Dated September 15, 1856.

2158. ALEXANDER ROWAND, of Glasgow, for cases or vessels for holding gunpowder.—Dated September 15, 1856.

2176. ANTOINE ANDRAUD, of Paris, for improvements in wheelbarrows.—Dated September 17, 1856.

2179. CARL HEINRICH SCHRODER, of Altona, Holstein, for a rotatory engine to be worked by steam or other elastic fluid, which invention is also applicable as a rotatory pump for raising and forcing liquids.—Dated September 17, 1856.

2200. ARCHIBALD TEMPLETON, of Skinner-street, London, and JOHN LAWSON, of Glasgow, for the manufacture of pile fabrics.—Dated September 29, 1853.

2241. VICTOR FREDERIC ANTOINE PROST, of Paris, for weaving and in the machinery or apparatus employed therein.—Dated September 24, 1856.

2242. ROBERT BROWN, of Glasgow, for taps or valves.—Dated September 25, 1856.

2256. MARIUS PELLEN, of Paris, for rendering impermeable by gas, caoutchouc, gold beaters' skin, paper, gauze, and similar materials used for things adapted to receive an ascending force, such as balloons, aërostatic machines, toys, &c., &c., by the application of a peculiar varnish.—Dated September 26, 1856.

2285. THOMAS ARTHUR DILLON and JOHN GRAY, M.D., of Dublin, Esquires, for an improved means for making signals on railway trains between the guard and driver respectively, and between the passengers and guard and driver, and of giving notice to the guard and driver in case of the accidental severance of the parts of a train; which invention is applicable also to steam ships, factories, and other places where it may be requisite to communicate with distant points.—Dated September 30, 1856.

2288. William Gostwyck Gard, of Calstock, Cornwall, for bits for boring and sinking.—Dated September 30, 1856.

2315. Peter Armand le Comte de Fontainemoreau, of Paris, and of South-street, Finsbury, London, for the construction of roofs of buildings; which improvements are applicable to the construction of arches of bridges.—Dated October 3, 1856.—(A communication.)

2524. William Brodie, of Bellhaven, for the manufacture or production of roofing tiles.—Dated October 28, 1856.

2694. Andrew Symington, of Kettle, for apparatus for drying yarns and woven fabrics.—Dated November 14, 1856.

2761. William Edward Newton, of Chancery-lane, for machinery for spinning or twisting fibrous substances.—Dated November 21, 1856.—(A communication.)

2781. George Salt, of Saltaire, York, for weaving carpets and other piled fabrics.—Dated November 24, 1856.

2782. James Broadley, of Saltaire, York, for weaving.—Dated November 24, 1856.

3051. Benjamin Goodfellow, of Hyde, Chester, for the construction of steam boilers.—Dated December 24, 1856.

3091. William Armand Gilbee, of South-street, Finsbury, London, and Paris, for treating beetroot for the manufacture of vinegar.—Dated December 30, 1856.—(A communication.)

3. William Rigby, of Salford, for machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other substances.—Dated January 1, 1857.

15. Joseph House, of the Minories, for concentrating and preserving milk and other liquid articles of food.—Dated January 1, 1857.

18. John Pettigrew, of Glasgow, for the manufacture of bread.—Dated January 2, 1857.

75. Robert Turnbull, of Harwich, for cradles for heaving up ships.—Dated January 8, 1857.

March 13, 1857.

2149. Christopher Hill, of the Great Western Railway, Chippenham Station, for the manufacture of lubricating matters.—Dated September 13, 1856.

2155. Cornelius Ferguson Clements, of Liverpool, for separating copper and other metals from ores containing them.—Dated September 15, 1856.

2171. Joseph Gilbert Martien, of U. S. A., and Essex-street, Strand, London, for the manufacture of iron.—Dated September 16, 1856.

2203. Edward Finch, of Chepstow, for the construction of wrought iron masts, bowsprits, yards, booms, gaffs, and spars, and in rigging ships.—Dated September 19, 1856.

2655. Hugh Baines, of Manchester, for machinery or apparatus to be applied to hoisting and other lifting machines.—Dated November 11, 1856.

2671. William Green, junior, and Thomas Storey, of Framwellgate Colliery, near Durham, for machinery or apparatus for washing or cleaning coal.—Dated November 12, 1856.

2984. Alfred Vincent Newton, of Chancery-lane, for printing presses.—Dated December 16, 1856.—(A communication.)

130. MATTHEW ANDREW MUIR and JAMES MCILWHAM, of Glasgow, for moulding or shaping metals.—Dated January 15, 1857.

March 17, 1857.

2172. ROBERT BURNS, of Liverpool, for bone mills.—Dated September 17, 1856.

2174. DAVID CRICHTON and JAMES CATHCART, of Manchester, for looms for weaving.—Dated September 17, 1856.

2175. JOHN BARBER, of Manchester, for machinery or apparatus for mill and other engraving, punching, dividing, and ruling rollers, either for hand or machine engraving, and an improved maundril, used in mill, eccentric, and other machinery, employed in engraving rollers for printing and embossing calicos and other fabrics.—Dated September 17, 1856.

2178. ALFRED LODWICK NEWMAN, of New Church-street, Bermondsey, for processes for separating animal from vegetable fibre, and for adapting the products to manufacturing purposes, and in the machinery employed therein.—Dated September 17, 1856.

2182. JOHN MUIR HETHERINGTON and JAMES GEE, of Manchester, for flyers for preparing cotton and other fibrous substances for spinning. —Dated September 17, 1856.

2190. WILLIAM FREDERICK PLUMMER, of Southwark, for preparing hard wheat and other hard grain for grinding.—Dated September 18, 1856.

2193. CHARLES GOODYEAR, junior, of Leicester-square, for the manufacture of penholders and handles for penholders.—Dated September 18, 1856.

2194. JEAN BAPTISTE HONORE DE ROUSSEN, of Paris, and of South-street, Finsbury, London, for apparatus for washing and cleansing ores.—Dated September 19, 1856.

2196. CHARLES FREDERIC VASSEROT, of Essex-street, Strand, London, for filtering water on a large scale.—Dated September 19, 1856.—(A communication.)

2198. PIERRE LAFFITTE, of Paris, for an engine with rotary piston applicable to various purposes.—Dated September 19, 1856.

2213. THOMAS WEBSTER RAMMELL, of Trafalgar-square, for constructing railways and propelling carriages thereon.—Dated September 20, 1856.

2215. ALFRED FORD, of Chelsea, for dissolving vulcanized india-rubber for waterproofing and like purposes.—Dated September 20, 1856.

2216. GEORGE WILLIAM SAYER, of Mark-lane, London, for machinery for stopping or retarding railway carriages.—Dated September 20, 1856.—(A communication.)

2239. WILLIAM BEATSON, of Rotherham, for puddling iron.—Dated September 24, 1856.

2244. JOSEPH WILLIAM WILSON, of Banbury, Oxford, for machinery or apparatus for manufacturing parts of brooms and brushes.—Dated September 25, 1856.

2326. CHARLES DURAND GARDISSAL, of Bedford-street, Strand, London, and of Paris, for the manufacture of cement.—Dated October 3, 1856.—(A communication.)

2381. ROBERT MCCONNELL and ALEXANDER MACKENZIE, of Glasgow, for supplying steam boilers with water, parts of which im-

provements or modifications thereof are applicable for the transmission of fluids and the indication of fluid-levels under pressure.—Dated October 10, 1856.

2563. EDWARD JOSEPH HUGHES, of Manchester, for an improved mode or method of concentrating the colouring matter of certain vegetable substances.—Dated November 1, 1856.

2983. WILLIAM EDWARD NEWTON, of Chancery-lane, for an improved process or processes of treating feldspar so that it may be used as a manure or for obtaining potash or soda therefrom.—Dated December 16, 1856.—(A communication.)

2999. GEORGE MILLER CLARKE, of Goldington, Herts, for the manufacture of moulded candles.—Dated December 18, 1856.

23. NICOLAUS CHARLES SZERELMEY, of Peckham, for preparing combinations of materials for rendering walls and other structures waterproof.—Dated January 2, 1857.

180. THOMAS KITELEE, of Everett-street, Brunswick-square, for a combination of ingredients to be employed as a breakfast powder or article of diet.—Dated January 21, 1857.

March 20, 1857.

2227. FRANCIS WRIGLEY, of Carlisle, for friction coupling for the transmission of motive power.—Dated September 23, 1856.

2233. ANDREW BARRIE, of Edinburgh, for registering the time at which workmen arrive at and leave their place of work, and for other such like purposes.—Dated September 24, 1856.

2237. PETER WILLIAM BARLOW, of Great George-street, Westminster, for improvements in the permanent way of railways.—Dated September 24, 1856.

2295. JAMES BEGG, of Glasgow, for improvements in preparing and bleaching textile fabrics and materials.—Dated October 1, 1856.

2305. EDWIN HARDON, of Stockport, and JOSEPH HENRY, of the same place, for looms for weaving, and in machinery for communicating motion to looms and other machines.—Dated October 2, 1856.

2327. ALEXIS PICARD, of Paris, and of South-street, Finsbury, for an improved tobacco pipe.—Dated October 4, 1856.

2352. FRANCIS WHITEHEAD, of Crayford, for producing devices in or on wood, leather, and other similar surfaces, whether for ornamenting the same or for the production of printing and embossing surfaces therefrom.—Dated October 8, 1856.

2371. LEWIS JACOB JORDAN, of Berners-street, for a medicine for the cure of venereal affections.—Dated October 9, 1856.

2397. GIOVANNI BATTISTA PIATTI, of Genoa, for the production of ice.—Dated October 13, 1856.

2403. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for a composition for splitting or rending rock, stone, and earth.—Dated October 14, 1856.—(A communication.)

2413. GEORGE HAZELDINE, of Lant-street, Southwark, for carriages requiring poles between the horses or draught animals.—Dated October 15, 1856.

2481. FREDERICK WALTON, of Haughton Dale Mills, for the manufacture of brushes.—Dated October 22, 1856.

2515. BENJAMIN FERREY, of Trinity-place, Charing-cross, for ornamental plastering or stucco work.—Dated October 27, 1856.

2605. WILLIAM SEED, of Preston, and WILLIAM RYDER, of

Bolton-le-Moors, for machinery for slubbing and roving cotton and other fibrous materials.—Dated November 5, 1856.

2701. Henry Hawes Fox, of College-hill, for manufacturing brushes.—Dated November 15, 1856.

2727. William Brindley, of Moorgate-street, for the treatment and application of papier maché for covering floors, roofs, and other like useful purposes.—Dated November 19, 1856.

2863. Philipp Kurten, of Cologne, for the manufacture of mottled soap and yellow soap.—Dated December 3, 1856.

72. John James Russell, of Wednesbury, and Joseph Bennett Howell, of Sheffield, for the manufacture of steel tubes applicable to the flues of steam boilers and other uses.—Dated January 8, 1857.

111. François Auguste Verdeil and Emond Michel, of France, for obtaining extracts from madder for dyeing and printing.—Dated January 13, 1857.

247. George Cranstoun Trotter Cranstoun, of Chirnside-bridge, George Young, of Dunse, and John Lovell, of Chirnside-bridge, for generating steam.—Dated January 28, 1857.

March 24, 1857.

2254. Claude Langlois, of Bath, for improvements in photography.—Dated September 26, 1856.

2259. George Gower Woodward, of Kidderminster, for the manufacture of carpets.—Dated Septamber 26, 1856.

2263. George Neall, of Northampton, for a union gas stove for lighting and heating.—Dated September 27, 1856.

2269. Joseph Edwards, of Liverpool, for a ships' log.—Dated September 27, 1856.—(A communication.)

2275. James Noble Ward, of America, for self-priming fire-arms.—Dated September 29, 1856.

2277. Matthew Hickson, of Salford, for waterproofing certain woven fabrics.—Dated September 29, 1856.

2279. Robert Morrison, of Newcastle-upon-Tyne, for apparatus for lifting, lowering, hauling, and removing moveable articles, by the direct action of either water, steam, or gaseous vapour.—Dated September 29, 1856.

2292. George Flint, of Skinner-street, Thomas Wood, and Edward Wood, of Tachbrook-street, Pimlico, for a punching press or machine adapted to the purposes of stamping, coining, slotting, and embossing, and for cutting metal and other substances.—Dated October 1, 1856.

2320. David Ogilvy Boyd, of Welbeck-street, for constructing and arranging smoke and air flues.—Dated October 3, 1856.

2334. Herbert Mackworth, of Clifton, for the separation and treatment of mineral substances, and in coking, and in apparatus connected therewith.—Dated October 6, 1856.

2384. William Caswell Watson, of New York, U. S. A., for sewing machines.—Dated October 11, 1856.

2385. Anton Bruno Seithen, of Alpha-place, Caledonian-road, for machinery or apparatus for cutting cork in the processes of shaping and making stoppers of cork, and in the treatment of cork to be employed in the said processes, and to be applied to other useful purposes.—Dated October 11, 1856.

2429. William Jeffrey, of Glasgow, for machinery or apparatus for sawing or cutting wood.—Dated October 17, 1856.

2444. Isidore Delcambre, of Paris, for machines for composing and distributing type.—Dated October 18, 1856.

2494. Leonard Alexander Desachy, of Great Marlborough-street, for architectural mouldings, ornaments, and other works of art formed with surfaces of plaster or cement.—Dated October 23, 1856.

2520. James Fenton, of Low Moor, Bradford, for method of, and signal apparatus for, preventing accidents on railways.—Dated October 27, 1856.

2552. Henry Holcroft, of Paris, and of South-street, Finsbury, for steam engines especially applicable to agricultural operations.—Dated October 30, 1856.

2923. Hector Mottet, of Newlay, for fulling woven woollen fabrics.—Dated December 9, 1856.

2939. Richard Emery, of King-street, St. James's-square, for certain kinds of agricultural implements (for breaking clogs of earth and levelling the soil) called harrows.—Dated December 11, 1856.

2978. William Frederick Thomas, of Newgate-street, for sewing machines.—Dated December 16, 1856.

124. Charles Wye Williams, of Liverpool, for furnace grates and fire-bars.—Dated January 15, 1857.

153. Thomas Sagar and Christopher Turner, of Burnley, for power looms for weaving.—Dated January 19, 1857.

211. Pier Alberto Balestrini, of Brescia, Italy, for electric telegraphs.—Dated January 23, 1857.

257. George Fergusson Wilson, of Belmont, Vauxhall, for treating Burmese and such like petroleum.—Dated January 28, 1857.

295. Astley Paston Price, of Margate, for the separation of gold from certain auriferous mixtures, compounds, and products.—Dated January 31, 1857.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(*To the 24th March*, 1857, *inclusive.*)

401. John Chisholm, of Holloway, for the purification of gas.—Dated February 20, 1854.

407. John Urie, of Glasgow, for photographic pictures.—Dated February 20, 1854.

408. John Ramsbottom, of Longsight, for improvements in welding.—Dated February 21, 1854.

396. Nicholas Riggenbach, of Basle, for an apparatus for preventing incrustation in steam boilers.—Dated February 20, 1854.

432. Thomas Settle and Peter Cooper, of Bolton-le-Moors, for machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous materials.—Dated February 23, 1854.

457. Auguste Edouard Loradoux Bellford, of Castle-street, Holborn, for engines for generating power by means of the expansive force derived from heated air and gases, or by means of the expansive force of liquid carbonic acid and other expansible liquids.—Dated February 24, 1854.—(A communication.)

464. Charles Lamport, of Workington, for machinery used in ship-building.—Dated February 25, 1854.

555. William Septimus Losh, of Wreay Syke, for decolouring resins.—Dated March 8, 1854.

585. George Appolt, of Sulzbach, Prussia, and Charles Appolt, of Metz, France, for the manufacture of coke.—Dated March 10, 1854.

696. William Wood, of Monkhill House, Pontefract, for machinery or apparatus for the manufacture of carpets and other fabrics.—Dated March 25, 1854.

522. Caleb Bloomer, of West Bromwich, for spikes and bolts.——Dated March 3, 1854.

477. Leontide Agalaee Pallegoix and Alexandre Louis Bellange, of Paris, and South-street, Finsbury, for treating wheat and other grain.—Dated February 28, 1854.

524. William Vaughan, of Stockport, and John Scattergood, of Heaton Norris, for machinery, apparatus, or implements for weaving.—Dated March 3, 1854.

526. Charles Nightingale, of Wardour-street, Soho, for curling horsehair and other materials.—Dated March 4, 1854.

523. Joseph Bour, of Cullum-street, London, for evaporating saccharine liquids.—Dated March 3, 1854.

529. Felix Abate, of George-street, Hampstead-road, for printing and ornamenting surfaces.—Dated March 4, 1854.

612. Johnson Hands, of Epsom, for improvements in kilns.—Dated March 14, 1854.

562. James Smith, of Liverpool, for improvements in baking-ovens.—Dated March 9, 1854.

548. Henry Bernoulli Barlow, of Manchester, for waterproofing and finishing textile fabrics and yarns.—Dated March 8, 1854.—(A communication.)

550. George Beardsley, of Nottingham, for round or circular machinery for the manufacture of textile and looped fabrics.—Dated March 8, 1854.

547. Thomas Dunn, of Pendleton, for machinery and apparatus for moving engines and carriages from one line of rails to another, and for turning them.—Dated March 8, 1854.

558. William Warne, of St. Austell, Cornwall, for tubular steam-boilers or generators.—Dated March 8, 1854.

567. William Young, of Queen-street, Cheapside, for lamps.—Dated March 9, 1854.

573. William Peace, of Haigh, near Wigan, Lancaster, for machinery for measuring, indicating, and registering the flow of air, gas, and other liquids, and for governing the speed of steam or other engines.—Dated March 10, 1854.

580. William Mill, of Birmingham, for inkstands or inkholders.—Dated March 10, 1854.

583. Desire Parfait Lefevre, of Paris, and of Castle-street, Holborn, London, for an improved railway break.—Dated March 10, 1854.

584. Zephirin Boitteux, of Epinal, France, and Castle-street, Holborn, London, for machinery for sculpturing and carving.—Dated March 10, 1854.

710. George Collier, of Halifax, for looms for weaving terry and cut-pile fabrics.—Dated March 27, 1854.

684. FREDERICK SEILER, of Interlacken, Switzerland, and Castle-street, Holborn, London, for the manufacture and construction of solid and veneered, tesselated and other shaped woodwork, suitable for floorings, buildings, works of art, and other purposes.—Dated March 23, 1854.

576. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of South-street, Finsbury, London, and Paris, for the manufacture of candles. —Dated March 10, 1854.—(A communication.)

598. LAWRENCE WHITAKER, JOHN DIGGLE, and GEORGE HOWARTH, of Haslingden, Lancaster, for machinery or apparatus for spinning cotton and other fibrous materials.—Dated March 13, 1854.

603. EDWARD HAEFFELY, of Radcliff, Lancaster, for the manufacture of stannates of soda, potash, and ammonia.—Dated March 13, 1854.

910. HENRY BROWN, of Halifax, for combing wool, hair, cotton, and other fibrous materials.—Dated April 20, 1854.

629. ROBERT WEARE, of Plumstead Common, Woolwich, for the construction of galvanic batteries and apparatus connected therewith.—Dated March 16, 1854.

641. GEORGE HARMAN BARTH, of Mornington-crescent, Hampstead-road, for the mode of supplying and administering gases for the alleviation and cure of certain diseases.—Dated March 17, 1854.

637. RICE WILLIAMS HARRIS and THOMAS PATSTONE, of Birmingham, for shades or glasses for gas and other lamps.—Dated March 17, 1854.

640. ALEXANDER HENDRY, of Port Glasgow, for heating bakers' ovens.—Dated March 17, 1854.

646. JOHN HICK, of the Soho Iron Works, Bolton-le-Moors, for apparatus for heating the cylinders of steam engines.—Dated March 18, 1854.

649. PERCEVAL MOSES PARSONS, of Duke-street, Adelphi, for the construction of the permanent way of railways.—Dated March 18, 1854.

667. JAMES HANSOR, of the Wandsworth-road, for the manufacture of illuminating gas.—Dated March 21, 1854.

695. JOHN JEYS, of Northampton, for pulp from twitch or couch grass.—Dated March 24, 1854.

791. CHARLES DE BERGUE, of Dowgate-hill, for apparatus for acting on water and other liquid so as to force, displace, or propel the same, or a body floating thereon.—Dated April 6, 1854.

658. CLAUDE ADRIEN BERNARD CHENOT, of Paris, and of Castle-street, Holborn, for steel, iron, and different alloys, cast, welded, and moulded.—Dated March 20, 1854.

668. JOHN POLSON, of Paisley, Renfrew, for the manufacture of starch.—Dated March 21, 1854.

702. THOMAS JOHN SMITH and JOSEPH SMITH, of Queen-street, Cheapside, for the manufacture or construction of pocket-books, portfolios, and similar articles.—Dated March 25, 1854.

689. STEPHEN HOLMAN, of Colney Hatch, for machinery for raising and forcing fluids, part of which improvements is also applicable to the guiding of piston-rods generally, and other rods.—Dated March 23, 1854.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 5. Vol. XXIX. ENLARGED SERIES.—MAY, 1857.

Specification of the Patent granted to Hypolitte Mege, *Chemist, of Paris (Empire of France), for Improvements in the Manufacture of Bread.*—Dated June 14, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in making or manufacturing more nutritive, assimilable, substantial bread, and reducing its net cost.

I will not state in this specification the causes of the nutritious richness of bread, and its various effects on public salubrity, which important tenets have been long elucidated and pronounced upon by learned men, nor will I describe the chemical phenomena I have ascertained in the various periods of bread-making, which phenomena, though highly interesting as regards science, I shall only hint at as far as concerns their practical applications. However, I must state that the causes of acidity, sourness, bad taste, brownish colour, and heavy unpleasant looking of brown and rye bread, not being pre-existing in the corn itself, are necessarily the results of ordinary panification or

usual practice; and such alterations are caused by peculiar ferments existing in the brown and rye flour, and which produce the lactic, acetic, glucosic, ammoniacal, ulmic fermentation, together with the bad taste and brownish colour always resulting from such fermentations. These investigations I only hint at as having led me to a result that I wish to secure by these letters patent.

My improvements consist, therefore, in manufacturing white bread, having the characters of first quality bread, with using either all the white or raw elements that constitute either corn or rye, or in manufacturing white bread with such substances as could produce to this day but brown bread. It is well known that all the contrivances used till now never conduced to any important results; thus chemical agents have been employed, which proved more or less unwholesome, such as alum, magnesia, chalk, lime; the washing of brans, and other foul parts, have been also tried, which afforded a larger amount of product indeed, but at a greater expense, and finally could yield but brown bread. The following are the means I employ to obtain my new product:—

First, the application of vinous fermentation, produced by alcoholic ferment or yeast, to destroy the ferment that I call "cerealine" existing, together with the fragments of bran in the raw flour, and which in some measure produces the acidity of brown bread directly whilst it destroys indirectly most part of the gluten.

Secondly, the thorough purification of the said flour, either raw or mixed with bran, (after dilution and fermentation,) by the sifting and separating of the farinaceous liquid from the fragments of bran disseminated by the millstone into the inferior products of corn.

Thirdly, the employing that part of corn producing brown bread in the rough state as issuing from the mill after a first grinding, in order to facilitate its purification by fermentation and wet sifting.

Fourthly, the employing an acidulated water (by any acid or acid salt) in order to prevent the lactic fermentation, preserving the vinous fermentation, preventing the yellow colour from turning into a brown colour (the ulmic acid), and the good taste of corn from assuming that of brown bread. However, instead of acidulated water, pure water may be employed with an addition of yeast, as the acid only serves to facilitate the vinous fermentation.

Fifthly, the grinding of the corn by means of millstones that crush it thoroughly, increasing thereby the quantity of foul parts, a method which will prove very bad with the usual process, and very advantageous with mine.

Sixthly, the application of corn washed or stripped by any suitable means.

Seventhly, the application of all these contrivances to wheat of every description, to rye, and other grain used in the manufacture of bread.

Eighthly, the same means applied to the manufacture of biscuits.

I will now describe the manner in which the said improvements are carried into effect.

First Instance.

When Flour of inferior quality is made use of.—This description of flour, well known in trade, is bolted or sifted at seventy-three, seventy-five, or eighty per cent. (a mark termed Scipion mark in the French War Department), and yields bread of middle quality. By applying to this sort of flour a liquid yeast, rather different from that which is applied to white flour, in order to quicken the work and remove the sour taste of bread, a very nice quality will be obtained, which result was quite unknown to everybody to this day, and which none ever attempted to know, as none before me was aware of the true causes that produce brown bread, &c.

Now, to apply my process to the said flour (of inferior mark or quality) I take a part of the same, a fourth part for instance, which I dilute with a suitable quantity of water, and add to the farinaceous liquid one portion of beer yeast for two hundred portions of water, together with a small quantity of acid or acid salt, sufficient to impart to the said water the property of lightly staining or reddening the test paper, known in France by the name of "papier de tournesol." When the liquid is at full working I mix the remaining portions of flour, which are kneaded, and then allowed to ferment in the usual way. The yeast applied, which is quite alcoholic, will yield perfectly white bread of a very nice taste, and I declare that if similar yeast were ever commended before, it was certainly not for the purpose of preventing the formation of brown bread, the character of which was believed to be inherent to the nature of the very flour, as the following result will suffi-

ciently prove it, thus divesting such an application of its industrial appropriation.

SECOND INSTANCE.

When Raw Flour is made use of.—By raw flour I mean the corn crushed only once, and from which ten to fifteen per cent. of rough bran have been separated. Such flour is still mixed with fragments of bran, and is employed in trade in the manufacture of so-called white flour and bran after a second and third grinding or crushing. Instead of that, I only separate, and without submitting it to a fresh crushing, the rough flour in two parts, about seventy parts of white flour and fifteen to eighteen of rough or coarse flour, of which latter the yeast is made; this I dilute with a suitable quantity of water, sufficient to reduce the whole flour into a dough, say, fifty per cent. of the whole weight of raw flour. To this mixture have been previously added the yeast and acid (whenever acid is applied, which is not indispensable, as before stated,) and the whole is allowed to work for six hours at a temperature of seventy-seven degrees Farhenheit for twelve hours at sixty-eight degrees, and for twenty hours at fifty-nine degrees, thus proportionally to the temperature. While this working or fermentation is going on, the various elements (cérealine, &c.) which by their peculiar action are productive of brown bread, have undergone a modification; the rough parts are separated, the gluten stripped from its pellicles and disaggregated, and the same flour, which, by the usual process could have only produced deep brown bread, will actually yield first-rate bread, far superior to that sold by bakers, chiefly if the fragments of bran are separated by the following process, which consists in pouring on the sieve, described hereafter, the liquid containing the rough parts of flour thus disaggregated and modified by a well-regulated fermentation.

The sieve alluded to, which may be of any form, and consist of several tissues of different tightness, the closest being ever arranged underneath or the most forward, when the sieve is of cylindrical or vertical form, is intended to keep back the fragments of bran, which would by their interposition impair the whiteness of bread, and by their weight diminish its nutritive power. The sifted liquid is white, and constitutes the yeast with which the white flour is mixed after being separated, so as to make a dough at

either a first or several workings, according to the baker's practice. This dough works or ferments very quickly, and the bread resulting therefrom is unexceptionable. In case the whiteness or neatness of bread should be looked upon as a thing of little consequence, a broader sieve might be employed, or even no sieve used at all, and yet a very nice bread be obtained.

The saving secured by the application of my process is as follows:—By the common processes, out of one hundred parts of wheat seventy or seventy-five parts of flour are extracted, which are fit to yield either white or middle bread, whilst, by the improved process, out of one hundred parts of wheat eighty-five to eighty-eight parts will be obtained, yielding bread of superior quality, of the best taste, neatness, and nutritious richness.

In case new yeast could not be easily provided, the same should be dried at a temperature of about eighty-six Fahrenheit, after being suitably separated by means of some inert dust, and previous to being made use of it should be dipped into ten parts of water, lightly sweetened, for eight to ten hours, a fit time for the liquid being brought into a full fermentation, at which time the yeast has recovered its former power. The same process will hold good for manufacturing rye bread, only twenty-five per cent., about, of coarse bran are to be extracted. For manufacturing biscuits, I use also the same process, only the dough is made very hard and immediately taken into the oven, and the products thus obtained are far superior to the common biscuits, both for their good taste and preservation. Should, however, an old practice exclude all manner of fermentation, then I might dilute the rough parts of flour into either acidulated or not acidulated water, there to be left to work for the same time as before, then sift the water and decant it, after a proper settling of the farinaceous matters of which the dough is to be made; thus the action of the acid, decantation, and sifting, would effectively remove all causes of alteration, which generally impair the biscuits made of inferior flour.

The apparatus required for this process is very plain, and consists of a kneading trough, in which the foul parts are mixed mechanically, or by manual labour, with the liquid above mentioned. From this trough, and through an opening made therein, the liquid mixture drops into the fermenting tub, deeper than wide, which must be kept

tightly closed during the fermenting work. At the lower part of this tub a cock is fitted, which lets the liquid mixture down upon an inclined plane, on which the liquid spreads, so as to be equally distributed over the whole surface of the sieve. This sieve, of an oblong rectangular form, is laid just beneath, and its tissue ought to be so close as to prevent the least fragments of bran from passing through; it is actuated by the hand, or rather by a crank. In all cases that part of the sieve which is opposite to the cock must strike upon an unyielding body, for the purpose of shaking the pellicles remaining on the tissue, and driving them down towards an outlet on the lower part of the sieve, and thence into a trough purposely contrived for receiving the waters issuing from the sieve, and discharging them into a tank.

The next operation consists in diluting those pellicles, or rougher parts, which could not pass through the sieve, sifting them again, and using the white water resulting therefrom to dilute the foul parts intended for subsequent operations. The sieve or sieves may sometimes happen to be obstructed by some parts of gluten adhering thereto, which I wash off with acidulated water for silk tissues, and with an alkali for metallic ones. This washing method I deem very important, as its non-application may hinder a rather large operation, and therefore I wish to secure it. This apparatus may be liable to some variations, and admit of several sieves superposed, and with different tissues, the broadest, however, to be placed uppermost.

Among the various descriptions and combinations of sieves that may be employed, the annexed sheet of drawings shows one that will give satisfactory results.

Fig. 1, is a longitudinal section; and

Fig. 2, an end view, of the machine from which the bran is ejected. The apparatus rests upon a cast-iron framing, *a*, consisting of two cheeks, kept suitably apart by tie pieces, *b*; a strong cross bar on the upper part admits a wood cylinder, *c*, circled round with iron, and provided with a wooden cock, *d*. The cylinder, *c*, receives through its centre an arbour, *f*, provided with four arms, *e*, which arbour is supported by two cross bars, *g* and *h*, secured by means of bolts to the uprights, *i*. Motion is imparted to the arbour, *f*, by a crank, *j*, by pulleys driven by the endless straps, *k*, and by the toothed wheel, *l*, gearing into the wheel, *m*, which is keyed on the upper end of the arbour,

f. Beneath the cylinder, *c*, two sieves, *n* and *o*, are borne into a frame, *p*, suspended on one end to two chains, *q*, and on the other resting on two guides or bearings, *r*, beneath which, and on the crank shaft, are cams, *s*, by which that end of the frame that carries the sieves is alternately raised and lowered. A strong spring, *u*, is set to a shaft borne by the framing, *a*, whilst a ratchet wheel provided with a click allows the said spring, according to the requirements of the work, to give more or less impulse or shaking as the cams, *s*, are acting upon the frame sieve carrying the sieve. Beneath the said frame a large hopper, *t*, is disposed, to receive and lead into a tank the liquid passing though the sieves. The filter sieve is worked as follows:—After withdrawing, by means of bolting hutches, seventy per cent., about, of fine flour, I take out of the remaining thirty per cent. about twenty per cent. of groats, neglecting the remaining ten per cent., from which, however, I could separate the little flour still adhering thereto, but I deem it more available to sell it off in this state. I submit the twenty per cent. of groats to a suitable vinous fermentation, and have the whole taken into the cylinder, *c*, there to be stirred by means of the arbour, *f*, and the arms, *e*; after a suitable stirring, the cock, *d*, is opened and the liquid is let out, spread on the uppermost sieve, *n*, which keeps back the coarsest bran. The liquid drops then into the second sieve or filter, *o*, by which the least fragments are retained; the passage of the liquid through the filters is quickened by the quivering motion imparted by the cams, *s*, to the frame carrying the sieve.

Having thus described the nature of my invention, and the manner in which the same is or may be carried into effect, I wish it to be distinctly understood that I do not confine myself to the precise details herein described, nor do I confine myself likewise to the strict form or shape of the apparatus or parts of the apparatus herein described; but what I claim as novel, and therefore as being secured to me by the hereinbefore in part recited letters patent, is,—

First, manufacturing white bread and biscuits of superior quality, by employing the whole flour contained in the corn, or, in other words, with such flour as never yielded till now but bread of an inferior quality.

Second, the use, in the coarse state, or in the state of

groats, of all those parts of the flour which never procured but brown and coarse bread.

Third, the employing at need of an acidulated water for the purpose of preventing the lactic fermentation, colouring, &c.

Fourth, the destruction by vinous fermentation of the ferment productive of other alterations, which constitute the chief features of brown bread.

Fifth, the thorough purification of the foul groats, above alluded to, by the wet sifting previous to or after fermentation.

Sixth, the revivification of dry beer yeast.

Seventh, the sifting apparatus above described, and the method of cleaning the sieves and washing off the adherent gluten that would hinder the work.

Eighth, the application of this principle to every description of grain employed in the manufacturing of bread.

Ninth, all the applications and details, substantially as described in the above specification.—In witness, &c.

HYPOLITTE MEGE.

Specification of the Patent granted to THEODORE SCHWARTZ, *of New York, United States, but now of* 67, *Gracechurch-street, London, for An Improved Brick.*—Dated June 19, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—

Fig. 1, is a bottom perspective view of a mould brick on the improved plan, showing a cavity with verticle corrugations and a top moulding.

Fig. 3, is a longitudinal section in perspective, showing one-half of a similar brick, differing only from that shown in fig. 1 by the introduction of a countersunk shoulder, (*a*, *a*, *a*,) in the lower edge of the cavity, to indicate that the form may be modified by that means for the purpose of attaching separately moulded projections like the one in fig. 4, when deemed desirable either to facilitate the manufacture or improve the working qualities of the brick.

Fig. 5, is a view of a brace such as may be used as lateral strengthening in the cavity of the brick.

Fig. 2, is a longitudinal section in perspective of a mould brick, having longitudinal corrugations on the interior of the cavity and mouldings at top and bottom.

Fig. 7, is the plan view of a full-sized perforated brick on the improved plan, made on the expression system by means of a single core.

Fig. 6, is a modification of fig. 7, in which the principle of the zig-zag arrangement is carried out longitudinally as well as transversely.

Fig. 8, represents, as before stated, the single core used for the brick, fig. 7.

Figs. 1, 2, 3, 4 and 5, are on the scale of half size.

The object of this invention is to produce a brick realizing certain practical desiderata not combined in any hitherto devised, without altering the general external form commonly given to that article, or losing any of the desirable properties of the common brick. This object I attain by removing vertically from its central portion, by a variety of means, such a quantity of the material as can be advantageously dispensed with, and by giving a peculiar configuration to the cavity or cavities thus produced.

The principle of my improvements may be embodied in several forms of brick, one or another being preferred according to the character of the masonry to be executed, or the particular mode of manufacturing the article that may be found most desirable or convenient. On the accompanying drawings I have represented five such forms, figs. 1, 2, and 3, showing bricks on my new plan formed in moulds, while figs. 6 and 7, show bricks made on the same principle by the ordinary expression brick machine. The forms of the latter, although dissimilar, realize the same aim and advantages as the first; these advantages are superior lightness, increased facility of drying and burning, greater non-conduction to damp, sound, and heat, ready ventilation, improved bearing, binding, and keying, an economical mortar surface, and a form that can be cut to advantage; the aim being to produce a light non-conducting ventilating brick, which is so perforated as to afford an effective and uniform distribution of the material, and whereby the thickness of the article may be increased to any desired extent without prejudice to the drying and burning.

In the moulded brick represented, fig. 1, the cavity, *a*, extends from the top to the bottom of the article, and

leaves it in fact an open hollow frame of clay. The interior surface of this frame is moulded into vertical corrugations, ridges, or ribs, *a*, *a*, of any desired form and number, to impart the maximum of strength to the material. The bottoms and edges of these corrugations afford superior bearing and bonding surfaces. The corrugations do not, in this instance, extend to the top of the brick, but are cut off by and merged into a horizontal moulding or fillet, *b*, which, spreading out above them, contracts the cavity at the top to a narrow elongated aperture, reducible into a mere slit or fissure or fissures of whatever configuration, thus leaving an ample and properly situated receiving surface for the mortar.

The form thus produced may be strengthened for handling in the green state by the insertion of one or more transverse braces or supports, like fig. 5, of any convenient shape, made of clay, separately moulded and put in place after the brick is formed; braces thus inserted become incorporated in burning with the body of the brick, and greatly diminish the liability to breakage in transportation. Fig. 2, shows another form of moulded brick, differing from fig. 1, in having longitudinal instead of vertical corrugations.

The two styles of brick, described above, require to be made in moulds, whether by hand or by machinery; they cannot be produced by the system of expression through dies without modification; as it is desirable, however, to apply that mode of manufacture to my invention, I have devised a variation of form, which secures the combination of advantages stated to be my aim, while it is easily produced by the application of a single core to the die of an ordinary expression machine. The nature of the modified form is to secure a proper mortar surface, by reducing the hollow spaces or grooves between the ribs, so as to dispense with the moulding, *b*, fig. 1, carrying the ribs through and through, thus producing a brick whose top and bottom surfaces are alike, without abandoning any of the objects or principles involved in the construction of the mould bricks, figs. 1 and 2.

Figs. 6 and 7, are illustrations of forms such as I propose to apply as above to the expression system of brick making. The adaptation to the process in question is accomplished simply by enlarging the ribs or corrugations, and changing the shape of the central cavity into that of a

tortuous line of slits or narrow elongated passages of angular or undulated configuration or network of contracted cavities, which I prefer to arrange as seen in figs. 6 and 7, so that the projections or ribs, *c, c,* on one side of the middle line shall be opposite the slits or perforations, *e, e,* on the other, in other words, alternating the position of the ribs and slits one with the other, the object being to attain the maximum strength of the material in the bonding of the masonry. To prevent the brick, fig. 7, from losing its proper shape by the sagging of the upper side while in the green state, I give a slightly raised or arched form to that side, and add to the ends of the ribs, *c, c,* (on either or both sides,) projections like, *d, d,* so that when the clay has yielded or sagged far enough to make the raised side of the brick quite straight, the said projections, *d, d,* will come to bear firmly upon each other, and prevent any further depression or sinking. These projections thus brought into contact may or may not unite in burning; if united, they leave the brick perforated by a succession of transverse slits or angular cavities; the connexions, however, though united in the wet state, are likely to crumble away during the drying, so as to leave the whole perforation one continuous space.

I do not confine myself to placing the ribs, *c, c,* opposite to the slits, *e, e,* but when preferred the slits may be placed opposite to each other. I contemplate making the slits so narrow that the mortar will have little or no tendency to enter them (considering the absorption by which it becomes thickened), but if found desirable in practice, the cavities may be made wider by being narrowed at the top, by indenting the ribs, *c, c,* in such a manner as to widen their surface.

Fig. 8, represents the single core, by means of which the entire excavation or perforation represented, fig. 7, is produced.

Having thus described my invention, I wish it to be understood that I do not claim "making bricks by forcing clay through a moulding orifice having a series of cores to form holes or perforations in the brick," as I do not intend in any case to use more than a single core; but what I claim under the above in part recited letters patent is,—

First, the formation of bricks or building blocks, substantially as herein described and illustrated.

Secondly, the use of elongated perforations of undulated

or angular form, as exemplified, figs. 6 and 7, and of ribs, ridges, mouldings, fillets, or other analogous forms, as in figs. 2, 3, and 7.

Thirdly, the zig-zag arrangement of the ribs, as a means of securing strength.

Fourthly, making perforated bricks on the expression system, with two or more connected cavities or independent holes by means of a single core.

Fifthly, the application of indentations, depressions, or grooves for the purposes of contracting the perforations, to enlarge the surface on which mortar is to be spread, and increasing its hold.

Sixthly, I also claim the insertion or attachment of parts separately moulded. I do not limit myself to any particular dimensions, but intend making my improved brick of any size that may be found desirable in practice. And these claims I make as parts of a system of form, intended to realize the principles laid down in the introductory part of my specification, and as presenting such modifications of the particular forms hereinbefore described as I have contemplated as coming properly within the scope of my invention.—In witness, &c.

THEODORE SCHWARTZ.

Specification of the Patent granted to HENRY BENSON JAMES, *of Derby, in the County of Derbyshire, Engineer, for Improvements in Moulding Metallic Castings.*—Dated June 11, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The object of my invention is to mould railway chairs or other castings with countersunk or other holes or cavities therein, of any form of shape, by attaching to the pattern "shifting pieces" of metal (or other appropriate substance), which are left on the cores after the pattern is withdrawn, and subsequently removed by hand, or, as hereafter stated, by other means. I would here observe that, although my invention is applicable in moulding or casting other articles, I confine myself in the following description to those known as railway chairs; and I would further remark that, having stated above that other substances besides metal may be

used to make the shifting pieces, if desirable, I shall, to avoid repetition, confine myself to the use of the word metal in my specification,

The shifting pieces, above mentioned, are attached or not to the pattern, as may be found most convenient, and are made of any number or form that may be requisite to form the hollow or cavity required in the railway chair to be cast; they work or slide in tapered or straight grooves, or the grooves may be both tapered and straight, and are formed with projections or stops, curved or otherwise, and are either fixed into the before-mentioned grooves, or *vice versâ*, so that when the pattern is being raised or removed from the mould, the projections or stops traverse in the said grooves until the catch at the ends thereof lift the shifting pieces from out of the mould with the pattern; or, if it be preferred, the grooves or stops may be dispensed with, and the shifting pieces may remain in the mould after the withdrawal of the pattern, and then be taken out by hand or otherwise. I also make what I term a core protector, by causing pieces of metal to remain on cores until the before-mentioned pieces of metal (shifting pieces) expand, by means of the grooves and stops aforesaid, which protect the edges of the sand core during the expansion of the shifting pieces, and by means of a nut or boss attached to the rod of the said core protector, catching or resting on a washer or ring; it is lifted at the same time that the pattern is withdrawn from the mould, as will be ascertained on reference to the drawing.

I also construct patterns for railway chairs by making two pieces of metal shaped to and forming the opening of the rail, and the key coming below the bearing of the rail and the key, and having but one joint in the part of the pattern which forms the said opening for the rail and the key; thus, when part of the pattern is withdrawn from the mould, the two pieces of metal aforesaid remain therein, to be removed by hand, or otherwise.

In the drawing, fig. 1, represents a side elevation of the invention, partly in section, showing the pattern imbedded in the sand mould, and as it would appear before being lifted therefrom.

Fig. 2, is a side elevation of the same, partly in section, showing the pattern partially removed from the mould.

Fig. 3, is a side view of another mode of drawing the pattern from the mould.

At fig. 1, A, A, is the pattern of a railway chair, with shifting pieces of metal, B, B, working in grooves, C, C, and having projecting pieces or stops, D, D, on their upper ends, to prevent the pieces, B, B, falling out at the bottom of the grooves, C, C; these grooves having pieces affixed to their lower ends for that purpose. The pattern, A, A, having been first placed on a moulding board and rammed in the sand box, the sliding pieces, B, B, are in their right posi tion (as shown at fig. 1), the sand thus rammed making the cores, each end of the pattern being made with other shifting pieces to form the counter-sunk holes cores; pieces E, E, are placed at each end of the pattern, and made to slide up and down as protectors to the countersunk cores. The grooves C, C, converge towards the upper part of the pattern, so that when the pattern, A, A, is raised from the mould by means of a handle, or otherwise, the pieces, B, B, by their own weight, slide down the grooves, C, C, until the projecting pieces, D, D, shall catch in the lower ends of the grooves, C, C, and so lift the shifting pieces, B, B, out of the mould without in any way injuring the said cores; but in some cases, as aforesaid, it may be desirable to dispense with the projecting stops, D, D, and allow the shifting pieces to remain in the mould, and to be removed by hand, or otherwise.

At fig. 2, will be seen the pattern, A, A, partly lifted out of the mould, with the projecting pieces, D, D, just coming in contact with the bottoms of the grooves, C, C, [H.B.I. (and as before stated the grooves, C, C,) H.B.I.] converging towards the centre, it is obvious that the shifting pieces, B, B, upon reaching the lower ends of the grooves, will be delivered from the sand, thereby causing the countersunk holes cores to be made without injuring the said cores, as also the centre core.

At fig. 3, is shown another mode of drawing the centre shifting pieces, B, B, which in this case are made in two pieces, the outside surfaces being parrallel or not with each other, so that when the pattern is lifted from the top of the molding box in a vertical direction, the pieces, B, B, are left in the mould, and are afterwards drawn from the mould by a thumb piece on the top thereof. The shifting pieces of metal may be made to shift or move by the means of water or air being forced at the back of the said pieces of metal or other substances, or *vice versâ.*

Having now described the nature of my invention, and

the means by which I carry it into practical effect, I desire it to be distinctly understood that I do not confine myself to any particular number of the shifting pieces hereinbefore mentioned and described, or to the form or shape thereof, as they may be varied in form to suit the requirements of each particular case; nor do I restrict myself to the employment of a metal of any kind, or even of metal itself, in the making of the various portions of my herein described improvements, as any substance may be used for that purpose which may be found applicable thereto; but I claim,—

Firstly, the method of moulding railway chairs or other metallic castings with countersunk or any formed or shaped interior holes or cavities by means of shifting pieces of metal or other substance, as hereinbefore described.

Secondly, the combination hereinbefore described of pieces of metal or other substance, forming a core protector, and,

Thirdly, the construction of patterns with two pieces of metal or other substance, shaped to and forming the opening of the rail, and having but one joint, as hereinbefore described.—In witness, &c.

HENRY BENSON JAMES.

Specification of the Patent granted to JAMES KENYON, *of Bury, in the County of Lancaster, and* RICHARD KENYON, *of the same place, Manufacturers, for An Improved Fabric to be used in Printing and other similar Purposes, and a Method of Joining or Connecting the Ends of the same.*—Dated June 25, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—Our invention relates to the endless aprons, sheets, or bands of cloth that form a bed for the calico or other fabric to be printed upon in printing machines, and consists in forming the same of a linen fabric of a sufficient strength or thickness, woven at the ends in such a manner that a joint of equal thickness with the cloth aforesaid may be produced.

In order to explain how this may be carried into effect,

we will refer to certain diagrams accompanying this our specification.

Fig. 1, represents the section of a piece of cloth woven of any desired thickness from *a* to *b*. From *a* to *c*, *d*, the warp has been divided so as to form two cloths, as is well understood in reference to weaving tubes and other fabrics, but the selvages are left separate so that they may be opened from each other, as shown.

Fig. 2, represents another such piece so woven; in order to join these together, one loose part of each piece is removed, those denoted by *d*, *a*, *c*, *a*, for instance, and the former is brought over the latter, as in fig. 3; the lapping pieces are then pressed together and united by means of india-rubber, paste, or any other suitable adhesive substances. Instead of producing the cloth from *a* to *b*, as above described, it may throughout its length be woven double, but united at the selvages, excepting at the parts *a*, *c*, and other modifications may be adopted on the same principle.

By the use of these improved cloths of linen a smoothness and substances may be obtained, which will obviate the necessity of joining together several thicknesses, as now practised; nevertheless, we do not confine ourselves to the use of cloths of one thickness only, as two or more may be employed, combined, if desired, with calico or other fabric ordinarily used, provided the main feature of depending upon the linen be maintained.

We would also observe that, although we have particularly referred to printing machines, we of course include the use of our invention to similar purposes, as padding.

Having thus described and ascertained the nature of our invention, we desire it to be understood that we claim,—

Firstly, the application of linen fabrics for the purposes above set forth.

Secondly, the weaving of such cloth so that the ends are of such a thickness as to admit a joint equal in substance to the other part thereof.—In witness, &c.

James Kenyon.
Richard Kenyon.

Specification of the Patent granted to AMEDEE FRANÇOIS REMOND, *of Birmingham, in the County of Warwick, Gentleman, for Improvements in the Manufacture of certain Kinds of Metallic Vessels.*—Dated October 27, 1853.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates to such kinds of metallic vessels as are of a cylindrical form, and are made of wrought or malleable iron, such as the iron bottles used for holding and transporting mercury.

In making bottles of wrought iron, after the manner of my invention, I proceed as follows:—I form the body of the bottle of a sheet of iron rolled up into a cylindrical form, and the edges of which are joined by welding. I afterwards weld upon this hollow cylinder a top and a bottom. I conduct these processes by means of the machinery hereafter described and represented in the accompanying drawings.

The first stage of my improved method of manufacturing bottles in wrought iron consists in bevelling the edges of the sheet of iron (of which the body of the bottle is to be made) which are to be welded together. The bevelling is effected by passing the heated plate between rolls, so fashioned as to bevel the opposite edges of the plate, the said bevelling being effected on opposite sides of the said plate, that is to say, as the said plate passes through the rolls a bevel is made on the two edges of the plate, which are simultaneously passing between the rolls, but the bevel on one edge is on the upper side, and the bevel on the opposite edge is on the lower side.

Fig. 1, represents in section a plate having its edges so bevelled.

I would here remark that the several processes hereinafter described are made to follow each other as quickly as possible, in order to economize heat, and that immediately before being subjected to any of the welding processes herein described the iron is brought to a welding heat in a suitable furnace. After the edges of the plate have been bevelled as described, the said plate is coiled

into a cylindrical form, the two bevelled edges being made to overlap each other.

Fig. 2, represents in vertical section one of the machines which I use for bending the plate into a cylindrical form. The said machine consists of a pair of rolls, *a*, *b*, and a cylindrical case or mould, *c*, surrounding the upper roller, *a*. The iron is introduced between the rolls, *a*, *b*, fig. 2; the said rolls, *a*, *b*, being at such a distance apart that they gently grip and carry forward the plate, *d*. The end, *e*, of the plate, *d*, is brought, by the action of the rolls, against the edge, *f*, of the case or mould, *c*, and is bent by the interior concave cylindrical surface of the said mould into a cylindrical form, that is to say, it is made to occupy the space between the interior of the said mould and the upper roll. As soon as the plate of iron has been bent into a cylindrical form, and its posterior end has passed from between the rolls, *a*, *b*, the said cylinder is drawn off the roll, *a*.

Fig. 3, represents in longitudinal section another machine for bending the plates into a cylindrical form. *g*, is a horizontal cylindrical block; *h*, is a hollow cylindrical case surrounding the block, *g*; *i*, is a slide working on the base plate, *k*, and having a reciprocating sliding motion communicated to it from a crank or wheel, *l*, by the crank rod, *m*. The heated and bevelled plate is laid upon the bed plate, *k*, when the slide, *i*, has receded to its farthest point from the block, *g*, and as the said stop, *i*, advances by the revolution of the crank or wheel, *l*, it forces the said plate into the space between the cylindrical block, *g*, and the case, *h*; the coil is drawn off the block, *g*, endwise.

After being brought to a welding heat the coiled plate is subjected to the action of the machine represented in side view in fig. 4, and in end view in fig. 5. The said coil is supported internally by the fixed core or mandril, *n*, and its lower half is supported externally by the semi-cylindrical support, *o*. The overlapping edges of the coil are placed uppermost in the machine. By the revolution of the eccentric, *p*, the arm, *q*, carrying the roller, *r*, is made to perform an alternating motion, by which the roller, *r*, is passed over the heated coil, *s*, and welds the edges thereof together during its passage over them. The pressure exerted by the roller, *r*, may be regulated at pleasure by loading the arm, *t*, which, acting through the arm,

u, gives vertical pressure to the roller, *r*. Or the edges of the coiled plate may be welded together by the machine represented in vertical section in fig. 6. The coil, *v*, is placed in the mould, *w*, of cast iron; the said mould being kept hot by fire placed on the bars, *x*, a stamp or plunger, *y*, is allowed to fall into the coil, *v*, and by pressing against the sides of the mould, *w*, weld its edges together; the welded coil is raised from the mould by the arm, *z*. It is necessary that the coil, *v*, mould, *w*, and stamp, *y*, be slightly conical. The sheet of iron having been made into a hollow cylinder by the treatment described, a top and bottom require to be welded to the said cylinder. The said top and bottom consist of circular discs of iron introduced into the ends of the cylinder; the disc of which the top of the bottle is made is perforated at its middle, and a short neck raised thereon. The discs constituting the tops and necks of the bottles are cut from sheets rolled by rolls of the form represented in elevation in fig. 7, the upper roll, 1, being so formed as to leave, at intervals on the plates of iron rolled between it and the lower roll, 2, shoulders or projections from which the short neck of the bottle may afterwards be made. The iron rolled by the machine fig. 7, is cut into circular discs by the machine represented in fig. 8; the plates are laid on the lower fixed die, 3, so that one of the shoulders or projections on the said plate shall be in the axis of the die when the moveable die, 4, descends and cuts the disc, 5, from the plate, 6. The hole, 7, in the disc, 5, may also be cut at the same time. The discs of which the bottom of the bottles are made are cut from plain sheets of metal. The cylinder, with the bottom placed in one end, is raised to a welding heat and subjected to the action of a tilt hammer, 8, fig. 9, which strikes the die or tool, 9, on the edge of the bottom of the partially formed bottle, and welds the said bottom to the cylinder. The said cylinder is supported on an anvil or die, similar in form to the die, 9, and during the action of the tilt hammer, 8, the cylinder is turned rapidly round by a second treatment with the tilt hammer, 8, and the die or tool, 9, and the lower tool or anvil; the top of the bottle is welded on the cylinder, and the bottle is completed. Instead of welding the top and bottom of the bottle to the cylindrical part thereof by means of a tilt hammer, I sometimes effect the same by a rolling process,

as represented in side elevation in fig. 10. The plates, 10 and 11, have shoulders, as represented; and the upper plate, 10, is capable of a reciprocating motion by means of the arm, 12, connected with a crank or eccentric on the main shaft of the machine. The said plates, 10 and 11, are slightly inclined to each other. The bottom plate, 11, is raised and lowered by levers placed in the screwed nuts, 11^1, 11^1, for the purpose of giving the requisite pressure and facilitating the removal of the cylinder. The cylinder, with its top or bottom placed therein, is raised to a welding heat, and being introduced between the plates, 10 and 11, at their widest end, the said partially formed bottle is, by the motion of the plate, 10, carried by a rolling motion to the narrow end of the said plates, 10 and 11, during which time every part of the shoulder of the bottle has been subjected to pressure, and the top or bottom welded to the cylindrical part of the bottle. Or the tops and bottoms of the said bottles may be welded therein by the same being placed between four or other convenient number of rollers, as represented in fig. 11, where 17 represents the bottle, and 13, 14, 15, and 16, the rollers between which it is rolled; the rollers, 13 and 14, are capable of rising vertically to permit of the introduction of the bottle under them. Or the tops and bottoms of the said bottles may be welded therein by the pressure of dies, as represented in fig. 12, in which said figure, 18, is the bottle, in which the top, 19, is to be welded. The said bottle is laid on a bed or fixed die, 20, and a moveable die, 21, descending compresses the end of the bottle, 18, between the said moveable die, 21, and fixed die, 20. A rapid reciprocating motion is given to the die, 21, by means of the eccentric, 22. On the axis, 23, a rotatory motion is given to the bottle, 18, during the time it is acted upon by the dies, 20 and 21. The machine may be made double, as represented. I sometimes make the said bottles with a bottom in one piece so as to require but one welding, that is to say, the welding in of the top, to complete the same; for this purpose I raise a disc of iron into a cup-like form, and subject the same to the action of the machine, fig. 13; that is to say, I place the partially formed vessel, 24, upon a fixed mandril, 25, situated between the rollers, 26 and 27; by the rotation of the said rollers the partially formed vessel, 24, may be drawn or elongated on the mandril, 25, to the required extent.

Having now described the nature of my said invention, and the manner of carrying the same into effect, I wish it to be understood that I do not limit myself to the precise methods herein described and represented in the accompanying drawing, as the same may be varied without departing from the nature of my said invention;

But what I claim as my invention is,—

Firstly, bevelling on opposite sides the parallel edges of iron plates to be rolled into a cylindrical form, and welded at the said edges for the purpose of making iron bottles or vessels.

Secondly, rolling up sheets of iron into a cylindrical form by forcing the same into the space between a cylindrical roller or block and a nearly cylindrical case, as hereinbefore described and illustrated in figs. 2 and 3 of the accompanying drawings.

Thirdly, welding together the edges of a coiled sheet of iron by rolling, as illustrated in figs. 4 and 5, or by pressure, as illustrated in fig. 6 of the accompanying drawings.

Fourthly, making the tops of metallic vessels or bottles by rolling sheets of metal, with a projection for the neck of the bottle, and cutting discs therefrom, as hereinbefore described and represented in figs. 7 and 8 of the accompanying drawings.

Fifthly, welding the tops and bottoms of metallic vessels to the cylindrical part thereof by means of a tilt hammer and dies, as represented in fig. 9 of the accompanying drawings.

Sixthly, welding the tops and bottoms of metallic vessels to the cylindrical part thereof, by rolling the same between plates having shoulders or projections, as hereinbefore described and represented in fig. 10 of the accompanying drawings.

Seventhly, welding the tops and bottoms of metallic vessels to the cylindrical part thereof, by rolling the said vessels between four or other suitable number of rollers, as hereinbefore described and illustrated in fig. 11 of the accompanying drawings.

Eighthly, welding the tops and bottoms of metallic vessels to the cylindrical part thereof, by pressing the same between a moveable and fixed die, as hereinbefore described and illustrated in fig. 12 of the accompanying drawings.

Ninthly, the method herein described, and illustrated in fig. 13, of forming or partially forming metallic vessels.—In witness, &c.

AMEDEE FRANÇOIS REMOND.

Specification of the Patent granted to WILLIAM RADFORD, *of Buckingham-street, in the County of Middlesex, Lieutenant in Her Majesty's Navy, for Improvements in the Construction of Metallic Beams or Bracings, and Metallic Sheets or Plates, applicable to the Building of Ships and other Structures where Lightness and Strength are required.*—Dated April 6, 1853.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention of "improvements in the construction of mētallic beams or bracings, and metallic sheets or plates, applicable to the building of ships and other structures where lightness and strength are required," relates, firstly, to an improved manufacture of beams and bracings to be used in place of simple angle iron. In constructing, for example, the framing of a ship according to this invention, I form compound beams and bracings, by first rolling metal bars of the form hereafter more particularly described into the required lengths, or by welding together pieces of moderate length, so as to form the required lengths; and while hot I bend or otherwise give to the said bars the required curves or figure, to form the ribs or other part of the ship or structure. I then fit or connect the bars together in any convenient way, and within the irregular or other shaped figures formed by these bars or bearers when put together, I place other bars or beams in close proximity thereto; the contact surfaces of the compound beams or bracings thus produced being such that the outer and inner system of beams and bracings shall interlock. For this purpose I form a rib on the inner face of the outer beams, and a corresponding recess in the contact surface of the inner beams, and I either rivet the two together, or leave them unconnected by bolts, but forming essentially a compound beam, of which the ship's framing is composed.

The second part of the invention relates to the method

of covering or enclosing this framing, so as to complete the hull of the ship, or the outside case of any other structure. To effect this purpose I employ plates having their edges formed in a peculiar manner, so that when put together the joints will form in appearance a butt joint, and, at the same time, possess the security of the ordinary lap joint.

In order, however, that the nature, object, and mode of carrying out my invention may be more clearly understood, I have shown in the accompanying drawings various views of part of the hull of a ship, some of the parts being also shown detached, and drawn to an enlarged scale, in order that their form and construction may be more clearly seen.

I would here observe that, although I have thought it desirable to refer more particularly to the construction of ships, to which purpose I consider my invention is more particularly applicable, I do not intend to confine myself thereto, as the peculiar plan hereinafter more particularly described of constructing vessels or buildings of iron may be applied with great advantage to a variety of purposes, such, for instance, as constructing bridges, viaducts, houses, or buildings, and other similar erections. The method of forming beams may also be applied to constructing the beams and framework of heavy machinery.

Fig. 1, is a transverse section of part of a ship constructed according to my improvements.

Fig. 2, is a longitudinal section of the same, showing a portion of the inside of a ship.

Fig. 3, is a cross section, drawn upon an enlarged scale, of the compound bars which form the beams of which the ribs and framing of the ship are composed.

Figs. 4 and 5, show the two bars separate, of which the compound beam is composed; and,

Fig. 6, is an enlarged edge view of the plates or sheets of iron with which the sides of the ship are constructed. The ribs or framing of the ship are composed of two bars, *a* and *b*, (fig. 3,) which, having been rolled into the required form, as shown in figs. 4 and 5, are fitted together, as shown in fig. 3, and, if required, may also be united by bolts or rivets to give greater strength.

Fig. 7, represents a modification of the above, two bars of angle iron being united together and secured by the hollow bars. The most convenient method of constructing

ships on my improved plan will be to take iron bars of the required form, such as those shown at *a*, figs. 3 and 4, and of convenient length, and weld their ends together, so as to make the rib on both sides of the ship of one long piece, which must be bent, while hot, into the required shape to form one of the ribs of the ship. These ribs may be placed at any required distance apart, according to the size and strength of the ship or vessel intended to be constructed. These ribs are strengthened by the application of the second bars, *b*, *b*, which are rolled in such a manner as to have a recess or groove on one side which will fit the projecting feather of the other bar, *a*. Upon rivetting, bolting, or otherwise uniting these bars, *a* and *b*, together, a structure of immense strength may be produced. It will not, however, always be necessary to add the second bars, *b*, *b*, to all the ribs, except for vessels of war. I therefore propose to adapt them only to every third or fourth rib, as may be found desirable. The framing of the vessel having been thus constructed, it will only be necessary to attach to the sides of the ribs the sheets or plates of iron which will complete the hull. These sheets or plates of iron are of two kinds: the one are shown at *c*, fig. 6, and may be called the parallel plates; they are made of any convenient length, and from twelve inches to two feet wide; they are rolled with bevelled edges, as shown at *c**, fig. 6; and before applying them to the sides of the ship they are placed in a planing machine; and a flat shoulder, as shown by dots, is planed away so as to receive the edge of the next plate, *d*, which is intended to be accurately fitted thereto, as shown at *c*, fig. 6. These parallel plates, *c*, are rivetted in their places on the ribs of the ship, at certain distances apart; after which the intermediate plates, *d*, are to be fastened thereon, also by bolts or rivets, as shown in the drawings. By this means all the advantages of both the butt and lap joints are secured, and a structure of immense strength is obtained.

Having now described my invention, and the best means with which I am at present acquainted for carrying the same into effect, I claim, in conclusion,—

First, the employment, for the construction of ships or vessels, of iron bars of the section shown in the drawing at *a*, figs. 3 and 4, or at fig. 7. I also claim forming the

ribs of ships or vessels, or beams for such or other purposes, of two or more separate bars united together, as shown in the drawings.

Second, I claim the method herein shown and described, or any mere modification thereof, of adapting, connecting, and fitting together the sheets or plates of iron, *c* and *d*, to form the sides of the ship or vessel, and whereby the advantages of the butt and lap joint are combined.—In witness, &c.

WILLIAM RADFORD.

Specification of the Patent granted to HENRY BESSEMER, *of Queen-street-place, New Cannon-street, in the City of London, for Improvements in the Manufacture of Iron and Steel.*—Dated August 25, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in obtaining crude or grey pig iron, hard white iron, and steel or malleable iron, direct from carbonaceous iron ores, or from any mixtures of carbonaceous ores with oxides or other ores of iron, by the application thereto of a blast of hot or cold air or steam, or of any other gaseous matter containing or capable of evolving oxygen or hydrogen gas, and without the requiring any fuel, except such as is contained in, or is evolved from, the said ores of iron, and from the gaseous matters forced into and among the pieces of ore, and into and among the particles of fluid metal which have been separated from the ore. This my invention may be carried into practical operation in several forms or modifications of furnaces or apparatus with more or less advantage; it will, however, be found that a vessel or furnace, similar in form to the generality of blast furnaces, is well suited for this purpose. I, however, prefer that the furnace should be of smaller dimensions than the generality of blast furnaces now used for smelting iron, but the shape and proportions of the interior may remain the same, and which are so well known and understood as not to render any further description thereof necessary. The iron ore, either raw or previously roasted, (I, however, prefer to use the ore raw,) and in a cold or in a heated state from such roasting process, is to be put from time to time into the upper part of the furnace or

vessel; the blast of air or other gaseous matter being forced through suitable tuyeres situated below the surface of the fluid metal. Or the blast may be in part directed into and among the pieces of ore at a level above the surface of the molten metal, so that the heat generated by the combustion of the carbon contained in the fluid metal below, and also in part by the combustion of a portion of the iron itself, may pass upward and act upon the upper part of the charge of ore and gradually melt it down, the slags being allowed to pass out of the vessel or furnace above the fluid metal, the discharge hole for the metal being situated below that through which the slags or scoria escapes. In practically carrying out this system of fusing the carbonaceous ores of iron I insert one or more fire-clay tuyere pipes on three sides of the hearth of the furnace, the fourth side being provided with a tapping hole at the lowest level of the hearth, the tuyeres before referred to being placed, by preference, near to the bottom or sole of the hearth, so that the air or other gaseous matters may enter beneath and bubble up through the fluid matters occupying the hearth of the furnace; I also fix other tuyeres above the level of such fluid matters, so that the air or other gaseous matters propelled through them will enter among the masses of solid matter under operation, consisting of pieces of carbonaceous iron ores and lime or other fluxes used to assist in their fusion, and in giving fluidity to the molten materials. In thus forcing air into a furnace or vessel containing ores of iron rich in carbon, it will be found that a very high degree of temperature will be produced, in part by a further combination of such carbon with the oxygen of the air, and in part by other combinations of oxygen with combustible materials contained in the iron ore, and that the solid masses of ore will, by means of the heat so generated, pass from the solid to the fluid state and settle down to the lower part or hearth of the furnace. The temperature of the furnace may also be assisted by the introduction of hydrogen, which, by uniting with the oxygen present in the materials, will also assist in raising the temperature and in the reduction of the metal. Hydrogen for this purpose may be most advantageously obtained in the form of carburetted hydrogen gas distilled from coal. When using air alone, large quantities of fluid cinder, rich in oxide of iron, are produced, and may be run into another chamber, and solid carbonaceous substances or car-

buretted gasses may be forced into and below the surface of such liquid cinder, whereby the oxide of iron will become reduced and metallic iron formed, as described in a patent granted to me for "Improvements in the Manufacture of Iron and Steel," and bearing date the 19th day of August, 1856. Or, in lieu of using the description of furnace herein described, my invention may be carried into practical operation by using a reverberatory furnace so constructed as to be heated by the heat evolved from fluid iron, and so that the fluid metal shall occupy a sunk chamber at one part thereof, in which case the ores are to be so placed as to receive heat from the reverberated heat and flame arising from the combustion of the carbon contained in the fluid iron which occupies the sunk chamber, and into which the very highly heated ore or the molten metal therefrom will pass. The fluid iron thus obtained may be cast into pigs, ingots, or other articles in moulds. Or it may be run into a separate vessel and be there converted into steel or malleable iron in the manner described in the specification of a patent granted to me on the 12th day of February, 1856.

Although I have described how my invention may be carried into operation in a reverberatory furnace, I nevertheless desire it to be understood that I prefer to use a furnace or vessel constructed on the plan of the blast furnace, as before described, because the ore and its fluxes are gradually heated by the ascent of heated matters among them in the upper part of the furnace, and the heat thereby economized. In commencing to work with such a furnace I put some coke into the crucible or hearth of the furnace, and by a blast of air through the tuyeres I thoroughly ignite the same. I then put on to the coke some pig iron, which will be rapidly melted and sink down on to the sole of the hearth. The furnace is then charged with carbonaceous iron ores and lime or other fluxes, not mixed, as in the ordinary process, with coke, coal, or other fuel. The lower tuyeres may then be opened and a blast of air allowed to enter the molten iron; the intense heat produced acting on the iron ore will cause its fusion accompanied by a further evolution of heat, and thus the process may be kept up, the charging on of materials going on as the charge diminishes from below, so that a continuous fusion of the ore may be kept up without the use of any fuel other than is contained in the ore and in the air or other gaseous matter forced therein.

Having described the nature of my invention, and in what manner the same may be carried into effect, I desire it to be understood that I do not confine myself to the precise details, provided that the peculiar character of my invention herein described be retained.—In witness, &c.

HENRY BESSEMER.

Specification of the Patent granted to CLAUDE LANGLOIS, *of Bath, in the County of Somerset, Artist, for Improvements in Photography.*—Dated September 26, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in a method of arranging photographic cameras so that the operator can adjust the focus from the front, or that side next the person or object to be taken; and also so that the moveable frame for containing the prepared glass or other material for receiving the image may also be used for ascertaining the correct focus; and for these purposes I prefer to arrange the camera in the following manner:—On one side of the camera I arrange folding doors hinged to the front and back, and closing together in the middle. The door which is hinged to the front end of the camera has a hole through it sufficiently large for the passage of the hand of the operator, and it is through this hole that he looks when focusing. For greater convenience, the portion of the door through which this hole is made is so arranged as to be inclined at an angle of forty-five degrees to the front of the camera when the door is closed. The slide for containing the plate is made of such a size as to close or fill the end of the camera, and it has a hinged door at the front and at the back, one for introducing the plate and the other to be open for exposing it. The frame thus constructed is mounted on a round foot of wood, under which and at its centre is a short projecting stud or pin which drops into a hole at the bottom of the camera; the door at the back of the slide is made white and is used for focusing upon, and when the slide is first put into the camera this slide is turned to the lense, and stops are employed to enable the operator to place it exactly parallel with the lense. When the focus is adjusted the slide is

turned half round, and the slide is so arranged that when it is turned round the prepared surface of the plate exactly occupies the place previously occupied by the white surface of the door. The operator opens the front door of the slide so as to expose the plate by introducing his hand through the hole in the door, and in order to prevent the entrance of any light through this hole it may have a sleeve of a light proof fabric attached round it. I furnish the camera with screw feet to facilitate its adjustment to any required inclination.

This invention also consists in backing photographic pictures with plaster of Paris. To obtain a picture suitable for backing in this manner I take first a negative picture in the ordinary way on glass with collodion, and from this negative picture I print a positive picture on another plate coated with collodion, and for this operation I prefer to employ the light of a lamp, as I find that I can in this way obtain more uniform results than when day-light is employed. The positive picture is developed and fixed in the ordinary manner.

To back this picture with plaster of Paris I mix the plaster into a paste, just such as will flow easily, and pour it on to the collodion surface of the plate, and over the plaster I apply a piece of muslin or other open fabric, and then pour on more plaster, and so on until enough has been put on to form the thickness of back required. When I wish to remove the glass from the picture and to leave it on the surface of the plaster, I coat the plate before printing the picture with a thin solution of gum, which I allow to dry on, and then when the picture has been printed and backed I soak it in warm water, which dissolves the gum and leaves the picture on the plaster. When dry the picture has a shining appearance arising from the presence of the collodion, and to remove this I wash the surface with pure ether. In order to render the picture more suitable for colouring I saturate the plaster with spermaceti or wax, which I for this purpose melt in a dish, and I dip the back of the picture into the melted matter, and allow it to remain until the plaster has sucked up the spermaceti or wax almost to the surface of the picture.

To strengthen the plaster I cement it by shellac or otherwise to a back of metal, millboard, or other suitable material.—In witness, &c.

Claude Langlois.

Specification of the Patent granted to THOMAS ROUTLEDGE, *of* 17, *Gracechurch-street, for Improvements in the Manufacture of Half Stuff and Paper.*—Dated July 31, 1856.

To all to whom these presents shall come, &c., &c.—The invention consists in the preparation of half stuff (paper pulp) and paper from esparto, or Spanish grass, by an improved and economical process, which is also applicable to other raw fibrous substances.

All raw vegetable fibrous substances are more or less combined or their fibres coated with gummo-resinous and siliceous matter, which must be removed before the bleaching process can be efficaciously carried out. To effect this, I boil the esparto or other fibrous substances (first cutting the same into pieces of a few inches in length) in a caustic ley, composed as follows, in the proportion to the hundredweight of fibrous material to be treated:—I take soda (using the impure caustic carbonate, known in commerce as soda ash, by preference,) and quick or caustic lime, from ten to fifteen pounds of the former, and a similar quantity of the latter; these are boiled together in a suitable vessel with a sufficient quantity of water (not less than ten times the weight of soda used), and after allowing the mechanical impurities to subside I decant or syphon off the caustic solution, adding thereto a further quantity of water, so as nearly to cover the fibrous substance in the boiler or vessel in which the boiling operation is to take place. The solution is in a milky state from the presence of excess of lime, and I have found in practice that a caustic ley composed in this manner has a more active effect in bringing into a soluble state the gummo-resinous and other matters combined with the fibre. The above strength of ley is sufficient for an ordinary class of half stuff, suitable for cartridge and common printing papers. When it is desired to produce a whiter half stuff, the quantity of soda with lime (in proportions as above described) may be increased with advantage up to twenty or even twenty-five pounds to one hundredweight of material treated to facilitate the subsequent process of bleaching, or the lime in excess may be allowed to deposit and the ley used clear, if considered desirable, for the finer or more delicate description of fibres. The strength of the caustic

ley cannot be distinctly defined (except within the limits above mentioned) for every description of fibre or for any individual fibre, as each will naturally be procured in different stages of growth and preparation; but the desired strength of ley may be considered determined when the fibre is found, after boiling, on being broken or torn asunder to present a pointed or jagged end, and the strength of the ley must be increased or diminished a little more or less until this point is arrived at.

The esparto, or other fibrous substance, is boiled in the caustic ley a suitable time, which is ordinarily from three to five hours, and I find out when the boiling operation has been carried on for a sufficient time by taking a sample of the fibre and pulling it apart, as before mentioned. When the proper indications are given, the fibre is drained, and then either in the same or another vessel boiled again for a short time in a solution composed of common carbonate of soda, in the proportion of two to five pounds to the hundredweight of fibrous material, or the bicarbonate may be used in less proportion; one hour's boil is sufficient to liberate or set free the colouring and gummo-resinous matters already disturbed, and which up to this time have been incorporated with the fibres, which latter are then completely disintegrated, and in a fit state to be taken to the ordinary rag-breaking and washing engines as at present in use, when the material is broken down into half stuff and bleached in the ordinary manner, as practised with rags, half stuff, then manufactured into paper, either by itself or mixed in varying proportions with the present rag material, according to the quality of paper desired to be produced. I may add that the boiling process in either case may be conducted in the ordinary rag boilers as known and practised; I employ the Lancashire bowking kier, also Donkin's cylindrical boiler; and also that I use the leys and soda solution again and again, until too highly charged with colouring and extractive matter, bringing them up to the desired degree of strength by adding the requisite quantity of soda or lime to bring them to standard, and as they become foul I use them in the manufacture of inferior half stuff and paper.

I am well aware that in February, 1852, a patent was granted to Jean Antoine Farina, for treating esparto for the manufacture of paper pulp, but his process is too tedious and costly for general use. A patent also was

taken by Messrs. Coupier and Mellier, for treating straw, and generally herbaceous matters, reducing the same into pulp without the aid of machinery, by boiling in strong caustic alkali, and treating with hypochlorite of alumina; but neither the one nor the other will admit of a long and perfectly bleached half stuff retaining its fibrous characteristics, as desired by the paper-maker, being economically obtained. Several other patents have also been taken for processes in treating fibrous materials, most of which, being inoperative, it is useless to refer to. I do not therefore claim the manufacture of half stuff or paper from esparto or other raw fibre generally;

But what I claim is,—

The treatment of esparto and other raw fibres by a ley containing more lime than is necessary to render the alkali caustic, and afterwards boiling and rinsing the fibre in a solution of carbonate or bicarbonate of soda.—In witness, &c.

THOMAS ROUTLEDGE.

Specification of the Patent granted to JOHN GEDGE, *of* 4, *Wellington-street South, Strand, in the County of Middlesex, for Improvements in Paint or Colouring Matter, applicable to Coating Metals and other Substances, whereby the Oxidation of Metal is Prevented, and Resistance to the Action of the Atmosphere, Rays of Heat, or Acids is Secured.*—Dated September 11, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—The object of this invention is to obtain a varnish, paint, or colouring matter which when applied to metals or other substances will adhere firmly thereto, be impervious to the several actions of humidity, atmospheric heat, or acids. By admixture of the substances hereinafter named, I have succeeded in obtaining a varnish, paint, or colouring matter possessing these properties, the use of which prevents oxidation of any metal which may be coated with it, and otherwise renders articles so coated or painted capable of resisting exterior destructive action. To obtain this paint, varnish, or colouring matter I mix in a metal pot or

other appropriate vessel "Jews' pitch" with an essence known in commerce as "Bayonne essence," in the following proportions, say, to one quarter of a hundredweight of Jews' pitch I add three quarters of a hundredweight of essence of Bayonne; I then apply moderate heat, taking care to stir or mix up the composition till the two substances are completely incorporated. The article to be coated with this composition may either be immersed in the fluid mixture, or the paint may be applied by brush, in the usual manner of coating substances with paint.

Having now described the nature of the invention communicated to me, I would here remark, that while I have given the component parts of the mixture as it is usually used, yet I do not confine myself to the exact proportions of pitch and essence herein given, as some variation may be required, from the better or inferior nature of the articles mentioned, as the component parts of the said varnish, paint, or colouring matter.—In witness, &c.

JOHN GEDGE.

Specification of the Patent granted to WILLIAM GOSSAGE, *of Widnes, in the County of Lancaster, Chemist, for Improvements in the Manufacture of certain Kinds of Soap.* —Dated September 9, 1856.

To all to whom these presents shall come, &c., &c.— My invention applies to the production of those kinds of soap which are or may be manufactured by combining certain compounds (obtained by the union of silica with soda or potash) with true soaps, which are prepared by the combination of alkali with tallow, resin, oil, or other such substances.

In the specifications which have been duly filed in pursuance of the conditions of three several letters patent granted to me for my inventions connected with the manufacture of soap, (the first of which letters patent bears date on or about the 3d day of April, 1854, the second bears date on or about the 3d day of August, 1854, and the third bears date on or about the 23d day of April, 1855,) I have described certain methods by which I caused compounds of silica with soda or potash to become com-

bined with soaps produced by the union of oily, fatty, or resinous matters with alkali. In the experience which I have acquired by following up my said inventions, I have found it desirable to reduce the proportionate quantity of free soda or potash contained in the compound of silica which I employ, or contained in the soap so manufactured, and thereby to produce a compound soap of a milder quality than those compound soaps in which the proportionate quantity of free soda or potash has not been so reduced.

I effect this object of my invention by the use of suitable acids, such as carbonic acid, sulphurous acid, sulphuric acid, or muriatic acid; and I prefer to add the acid (which I employ) to the compound soap after the same has been prepared by the union of the compound of silica with soda or potash with the true soap employed, and I thereby cause the acid employed to become combined with a portion of the soda or potash contained in the compound soap. I also reduce the proportionate quantity of free soda or potash contained in the compound of silica with soda or potash (which I am about to use for combining with true soap), previously to such compound being added to or mixed with true soap. I effect such reduction by the use of some of the acids hereinbefore mentioned.

I will describe the manner in which I prefer to effect my invention as applied to that kind of soap which is produced by "close boiling without separation of lyes," and with which silicate of soda or potash has been previously combined. (This method of production is particularly described in the specification of my invention for improvements in the manufacture of certain kinds of soap, for which I obtained letters patent, bearing date on or about the 23d day of April, 1855.)

Having prepared a boiling of such kind of soap, I add thereto a sufficient quantity of diluted sulphuric or muriatic acid to neutralize the greater part of the free soda or potash contained therein. I make such addition very gradually, and cause the same to become mixed with the compound soap by carefully crutching the same together, and I continue such additions of acid until I find that the free alkali previously contained in such compound soap has become sufficiently neutralized.

When I use carbonic acid or sulphurous acid, I employ such acid in the gaseous state. I obtain carbonic acid gas

by the combustion of coke, or by other well-known means, and sulphurous acid gas by the combustion of sulphur or by other well-known means.

I provide an air pump, by the use of which I cause the acid gas (which I employ) to be injected into a boiling of compound soap, prepared as hereinbefore mentioned; and by the use of a perforated pipe connected with the air pump and inserted in such soap, I cause the gas to be distributed therein in minute streams. I continue the injection of gas until I find that the compound soap has become sufficiently deprived of free alkali.

When I use liquid sulphuric or muriatic acid for neutralizing free alkali contained in silicate of soda or potash, preparatory to such silicate being used for the production of compound soap, I add such acid in a diluted state to a solution of silicate of soda or of potash, until nearly the whole of the free alkali previously contained in such solution has become neutralized. I agitate the solution of silicate during such addition of acid. When I use gaseous carbonic acid or sulphurous acid for neutralizing free alkali contained in silicate of soda or potash, preparatory to such silicate being used for the production of compound soap, I cause the acid gas employed to be injected into such silicate of soda or of potash in the manner hereinbefore described for the injection of such gas into compound soap; and I continue such injection until I find that nearly the whole of the free alkali previously contained in such solution has become neutralized. I employ such neutralized silicate for the production of compound soaps, in the manner I have described for the production of compound soaps by the use of ordinary silicates in the specifications of my inventions relating to soap, hereinbefore referred to.

I claim as my invention, secured to me by the said letters patent, bearing date the 9th day of September, 1856, and hereinbefore partly recited, the production of compound of soaps containing silicate of soda or of potash, in which the proportionate quantity of free soda or potash previously contained in the silicate employed, or previously contained in such compound soap, has become reduced by the use of acids hereinbefore mentioned, or by the use of some of such acids.—In witness, &c.

William Gossage.

Specification of the Patent granted to Peter Armand le Comte de Fontainemoreau, *of* 39, *Rue de l'Echiquier, Paris, and of* 4, *South-street, Finsbury, London, for Certain Improvements in Making Artificial Stone for Statues and Ornamenting Purposes.*—Dated September 6, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention consists in the manufacture of artificial stone for statues and ornamenting purposes by the following means:—I mix argil with red ochre or iron ores, in the proportion of about one-fifth argil. This mixture is pulverised and sifted and thrown into recipients prepared for the purpose; it is then sprinkled with acidulated water. The product of this operation resembles ordinary plastic clay, and may be moulded and manipulated by pressure, or by any other known means. When required to produce ornaments, like porcelain handles, the ordinary hand process is adopted, the joints being imperceptible after the baking. The material, thus prepared and moulded to the required form, is passed to the drying chamber and thence to the kiln, where it is submitted to a temperature at least equal to that required for fire-bricks. At this degree of heat the product undergoes a certain amount of vitrification, which gives to it a polish, and blueish colour, between that of iron and polished slate, and at the same time a hardness of texture, which enables it to be advantageously substituted for, first, granite and marble for pavements, chimney pieces, table tops, statues, &c.; secondly, baked earths for retorts, boilers, and vessels of all kinds employed in chemical manufactures, the composition being in no degree altered by the acids.

Having now described the nature of the said invention, and in what manner the same is to be performed, I would have it understood that I do not confine myself to the precise details herein laid down so long as the peculiar character of the invention be retained;—

But what I claim is, the production of an artificial stone for the purposes and in the manner hereinbefore described.—In witness, &c.

Peter Armand le Comte de Fontainemoreau.

Specification of the Patent granted to JOHN JOHNSTON, *of Ohio, in the United States of America, and of* 4, *Trafalgar-square, Charing-cross, in the County of Middlesex, for Improvements in Photographic Plates.*—Dated September 5, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—My invention consists in substituting in lieu of plates of glass, as commonly employed for taking photographic portraits upon, thin plates of metal, for example, sheet iron, one side or surface of which is coated with black japan, such said japanned surface being intended to receive the collodion coating, in the manner usually practised of coating plates of glass; the said japanned metal plates possessing this advantage, that whereas for positive pictures on glass the back of the picture requires to be covered with black varnish to throw up the shadows, by this invention, when the image or picture is developed the japan back ground is at once exposed to view; moreover the aforesaid metal plates may be afterwards easily cut to any desired shape.

In order to explain my said invention as completely as possible, I now proceed to describe the best means I am acquainted with for carrying the same into practical effect, as follows:—

Mode of Manufacture.

I take a piece of sheet iron (charcoal iron by preference) and cut and roll it to the desired size, length, and thickness by any of the known means of rolling and cutting plate iron; I then subject one side of such said strips or pieces of metal to the well-known process of japanning, as at present practised of japanning metal, taking care to keep such japanned surface free from grease of any kind. These japanned strips are then cut to the required width, in accordance with the different sizes of plates used by photographic artists. In using the above plates for taking pictures or portraits upon, the process is similar in all respects to that hitherto employed in using glass, with this advantage, that by the use of japanned metal plates the necessity for blacking the back of the picture is dispensed with, and a better pictorial effect is produced by taking the

picture directly upon the japanned black surface instead of having the thickness of the plate between the picture and the black back-ground.

Having now described the nature and object of my said invention of "Improvements in Photographic Plates," together with the best means I am acquainted with for carrying the same into practical effect, I hereby declare my invention to consist in, and I claim, the making of photographic plates of japanned metal instead of glass, as heretofore practised.—In witness, &c.

JOHN JOHNSTON.

Specification of the Patent granted to JOHN LOUDE TABBERNER, *of* 4, *Trafalgar-square, Charing-cross, in the County of Middlesex, for Certain Improvements in Smelting Ores.*—Dated September 4, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in a new and peculiar construction of furnace, having for its object,—

Firstly, a more expeditious mode of smelting ores than those hitherto employed for such purpose; and,

Secondly, for improving the condition or character of the metal of the ores when reduced to a molten state, by the use and employment of such said furnace, in conjunction therewith, the application of blast either hot or cold.

The principal features in this invention consist in directing the blast to the body or belly of the furnace, as well as to the hearth thereof, for the purpose of fusing or smelting the entire mass of ore in the furnace simultaneously, or nearly so. This may be effected by constructing the boshes of the hearth of the furnace of a pyramidical or conical form, with innumerable holes through the same for preventing the furnace from choking, it being proposed by this invention to crush the ores into particles to enable the metallic portion thereof to be more readily acted upon by the heat than when the furnace is charged with large lumps or cobs, as hitherto practised in smelting furnaces. Into the belly of the furnace tuyere pipes are built, for the admission of the blast thereinto; said pipes being in connexion with vertical and horizontal main pipes,

fitted with slides or dampers for regulating the quantity of blast admitted to any particular part of the furnace. The lower parts of the vertical blast pipes pass through small furnaces, in which fires are kindled when hot blast is required, the heat wherefrom passes up and along flues, in which the vertical and horizontal main pipes are placed for heating the air as it passes through and along the same. And it would be well here to remark, that the mode hitherto generally practised in smelting furnaces has been to direct blast into the hearth only thereof, thereby requiring several hours to smelt or fuse the contents of a large furnace.

The object and intention of this invention is, therefore, to dispense with the necessity for employing one or more large furnaces, and to use in lieu thereof several small furnaces, the combined capacities whereof are equal to that of one or more large furnaces, and to cause these small furnaces to discharge their contents at short intervals of time into one large reservoir, from which the molten metal may be drawn for casting from. And it is the above principle of constructing and arranging furnaces, and the directing of blast to any particular part thereof at discretion, which I claim as constituting my invention of improvements in smelting ores.—In witness, &c.

JOHN LOUDE TABBERNER.

Specification of the Patent granted to LOUIS CORNIDES, *of 4, Trafalgar-square, Charing-cross, in the County of Middlesex, for A New Method of Dressing or Preparing Hides, Skins, Intestines, and such like Animal Substances.* —Dated September 3, 1856.

To all to whom these presents shall come, &c., &c.—My invention relates to a new method of dressing or preparing hides, skins, intestines, and such like animal substances, which I propose to effect by the use and employment of certain ingredients hereinafter mentioned, for the purpose of altering the natural properties of gelatinous or glutinous compounds contained in various animal bodies or substances, such as the hides, skins, and intestines of animals. The ingredients which I propose to employ, for

the purposes of my said invention, are glycerine and solutions of acetate of alumina, or salts of alumina, by the use of which I soften the gelatine or gluten contained in various animal substances.

The first part of my said invention consists in preparing the hides for the application to various useful purposes, either as a new, firm, pliable, and semi-transparent material, or as a substitute for leather. The chemical ingredients above mentioned I use in the following manner:—The hair is first removed from the hides by the usual methods, and the hides thoroughly cleansed in pure water; I then place a batch of fifty or one hundred of said hides in a solution of glycerine, produced either by concentrating a solution known as "sweet liquor," (the refuse from the manufacture of candles and soap,) containing glycerine, or any other known method of manufacturing glycerine out of neutral fatty bodies. The hides to remain in the said glycerine solution from six to twenty-four hours, the length of time depending upon the thickness of the hides. When thoroughly steeped and saturated by the action of glycerine, the hides are then withdrawn, well washed in pure water, and dried. The result of the above process will be a firm, pliable, and semi-transparent material, applicable for many useful purposes. Another mode of dressing or preparing hides, and which I have found to produce a good substitute for leather, is as follows:—The hair is removed and the hides tanned by any of the known means, but the hides are only subjected to the tanning process sufficiently long to give a superficial appearance of leather to them. The hides, thus prepared, are then treated with glycerine in the manner above mentioned; and I would here remark, that as the application of the said prepared hides or skins to any particular purpose renders it necessary to make the same either more or less pliable and flexible, and for the purpose of rendering the materials employed perfectly insoluble in boiling water or steam, I propose to steep the hides or skins in an ordinary solution of acetate of alumina or salts of alumina; the concentration or strength of the aforesaid alumina solutions, and the length of time for steeping the hides or skins therein, depending upon the thickness and the required degree of hardness and insolubility of the same.

The second part of my said invention consists in preparing hides or animal skins in the following manner, so as

to retain and preserve the hair or fur permanently thereon :—The flesh and fatty substances are first removed in the usual way, and the hides and skins are then thoroughly cleansed and dried; I then apply with a brush, to the depillated or flesh side of the hide or skin, a mixture composed of concentrated glycerine and whitening, or ordinary pipe clay, mixed to the consistence of paint, so as to be readily spread upon the side of the hide or skin; the glycerine will be soon imbibed by the said dried material, and the result will be firmness and pliability of the hair or fur thereof. The dry whitening or pipe clay must be brushed off.

The third part of my said invention consists in treating and preparing other animal substances, namely, intestines, &c., in the following manner:—The intestines, when dry, are to be steeped in a solution of diluted glycerine or concentrated "sweet liquor," in the proportion of about three parts of glycerine to one part of water, and then dried; the result will be firmness, pliability, and softness of the said intestines. To give a certain colour to all the above mentioned materials, I mix a suitable vegetable dye with the glycerine, so as to combine the steeping process with the colouring processes.

Having now fully described and set forth the nature and object of my said invention of a new mode of dressing or preparing hides, skins, intestines, and such like animal substances, together with the best means I am acquainted with for carrying the same into practical effect, I would remark, in conclusion, that what I claim as my invention intended to be secured to me by the above in part recited letters patent is,—

Firstly, the use of glycerine in the dressing or preparing of hides and skins, as set forth and described under the first head of my said improvements.

Secondly, the mode set forth and described under the second head of my said improvements, of preparing hides or animal skins so as to retain or preserve the hair or fur permanently thereon, by the use of concentrated glycerine mixed with whitening or pipe clay, as above stated.

Thirdly, the use and employment of glycerine for treating or preparing the intestines of animals, as set forth and described under third head of my said improvements.

Fourthly, and lastly, the treating of hides or skins (prepared as above) with acetate of alumina or salts of alumina,

for the purpose of rendering the materials employed more or less hard, and also insoluble in boiling water or steam, as hereinbefore particularly described and set forth.—In witness, &c.

LOUIS CORNIDES.

Specification of the Patent granted to GEORGE CUMMING THOMAS, *of Washington City, United States of America, but now of* 67, *Gracechurch-street, in the City of London, for An Improved Method of Making Steel.*—Dated September 3, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—It consists in using and adding a composition of chloride of sodium, prussiate of potash, and bichromate of potash to molten iron, or in any lower degree of heating, so that the metal may be penetrated and acted upon by the compound, whose use is restricted in this specification to unmanufactured iron or iron not made up for special use. By this action the particles of the iron condense, and thus the metal in some cases may be partially but in others is wholly converted into steel.

This compound is applicable to the metal in the various stages of perfecting and refining it previous to its preparation for use or consumption from the blast furnace to its conversion into steel, or its being cast into forms. It may be added to the metal by putting them together in the melting chambers by running the metal into a chamber previously charged with the compound, and heated to a sufficient degree by placing the balls from the puddling furnace into a similar chamber, or in any other mode, time, or state of the process, that experience will prove most suitable for the object, as I do not consider the mode of applying the composition essential. In these and similar cases I should use for every forty pounds of metal, one pound of a flux composed of sixteen parts by weight of chloride of sodium, three parts of prussiate of potash, one of bichromate of potash, and add to it four of pulverized charcoal; bone, leather, and other animal charcoals may be substituted for a portion of the prussiate of potash, and in such case more chloride of sodium is required to keep up the flux. The materials are kept at a proper tempera-

ture for the requisite time until the compound has become thoroughly mixed with the iron, and it is ascertained in the usual way with the aid of practice that the conversion has taken place as far as required, when the metal is run off or otherwise removed and treated in the usual manner to be used. By this treatment, it is believed that a portion of the usual processes in preparing iron and steel may be dispensed with, and that in the earlier stages the iron will be found sufficiently refined for many purposes.

This compound may not perhaps be used economically with all kinds of iron, but with useful result, chiefly with those possessing mineral properties in greater or less degree destitute of the essentials requisite, or possessed of those deleterious to converting them into good steel under the ordinary mode of treatment, such for instance as the iron ore or stone from which most of the English iron is made.

When Solley, Jinks, Staffordshire, and other similar iron is to be converted into steel, for every forty-five pounds of metal prepared in the same manner as Swedish iron for the same purpose, one pound of the compound consisting of thirty-three parts of chloride of sodium, nine parts of prussiate of potash, and three of bichromate of potash, is put with it into the melting pot. The whole, together with five ounces of pulverized charcoal, is submitted to the same heat and treatment as Swedish iron, and poured off into ingots, is drawn into shapes for use, viz., for making cold chisels, plane irons, mortice chisels, and similar tools, and for general welding purposes. When this iron has been converted into English blister steel, and this is to be further refined, fourteen ounces of the compound, with two ounces of manganese, without charcoal, is used, and the whole subjected to the same course; this is best adapted for joiners' chisels, razors, and all tools made of solid steel not welded. When half converted, generally termed spring conversion, is to be refined, the same quantity of the composition with one ounce of manganese is employed, and a similar course pursued as before. Steel thus made is best fitted for files, turning tools, &c.

As a general rule, manganese renders the steel harder, and charcoal renders it tougher.

In hardening and tempering this steel, a low degree of heat must be used, the metal requiring to be brought to a moderate cherry red colour; herein consists the great

difference in working this and steel made from Swedish iron.

I do not confine myself to the exact quantity of the compound, nor to the proportions of its several ingredients, as these are to be varied to suit the different qualities of iron, nor to the use always of the prussiate and bichromate together, as I believe the latter may sometimes be dispensed with, though I prefer to use both.

Having now described my invention, what I claim is, the use and employment, substantially as described, of the composition, in its application to iron under the conditions above stated, for the purposes of refining it or making it into steel.—In witness, &c.

GEORGE CUMMING THOMAS.

Specification of the Patent granted to RICHARD HILL NORRIS, M.D., *of* 46, *Stafford-street, Birmingham, in the County of Warwick, for Certain Improvements in Photography by the Use of Collodion in a Dry Condition, and for a Means of Transferring Photographic Films.*—Dated September 1, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists, firstly, in rendering collodion films capable of being used in a dry condition by preserving their sensitiveness and porosity, which under ordinary conditions are destroyed on desiccation, and this part of my invention I purpose to accomplish in the following way:—I introduce into the pores of the collodion film, while still wet from the nitrate of silver solution (or after washing), certain substances soluble in or penetrable by watery solutions, which substances, occupying the pores of the collodion film, prevent its condensation on drying, and retain it in a sensitive and pervious state; and by this means I am enabled to produce beautiful pictures, either negative or positive, on perfectly dry and hard collodion films, which films are capable of retaining their sensitiveness for an unlimited period.

Heretofore it has been necessary, in order to preserve collodion films for even a short period, to maintain them in a moist condition by the use of hygrometric substances, as

honey, &c., or by deliquescent salts, as nitrate of zinc, magnesia, &c. The substances I employ to saturate the collodion films are very numerous, but the process may be described as follows:—Having produced in the film the sensitive iodide of silver by any of the ordinary known means, I immerse the film for varying periods in a solution of gum arabic, or of dextrine, starch, gelatine, albumen, gum tragacanth, vegetable mucilages, caseine, gluten, or other such like substances capable of fulfilling the above-named conditions; the films are then dried and are ready for exposure to light, or may be kept for any convenient length of time and used as desired.

The second part of my invention consists in a method of transferring photographic films from glass plates to elastic plates of gelatine; the mode in which I effect this is as follows:—A strong solution of gelatine is poured over the film and permitted to dry; when dry it is coated with plain collodion, and may be readily stripped from the glass, and then possesses the advantages of elasticity, compactness, lightness, and freedom from breakage. This mode of transfer is applicable to photographic films in general.

Having now described the nature of my said invention, and the manner in which the same may be carried into effect, I wish it to be understood that I do not limit myself to the precise methods, as the same may be varied without departing from the general nature and character of my said invention.—In witness, &c.

RICHARD HILL NORRIS.

Specification of the Patent granted to JAMES BLAKE *and* FRANCIS MAXWELL, *both of Kitchen-street, Liverpool, in the County of Lancaster, Soap Manufacturers, for Improvements in the Manufacture of Soap.*—Dated August 30, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—Our said invention consists,—

Firstly, in forming a soap by combining soap or saponified matter in the state in which it is commonly called soft curd, with a neutral soap which has not been deprived of its water. The curd soap which we use may

be formed of any of the oils or fatty matters usually employed in soap making, and such oils or fatty matters may be saponified by means of alkaline leys in the usual way, but we prefer to use curd made by means of the soda leys of the strength and in the quantity hereinafter mentioned, for the purpose of obtaining a soft curd better adapted for combining with a neutral soap; the saponified matter thus formed may be separated from the water or excess of leys with which it is mixed by means of salt, salt water, or concentrated soda leys, in the usual way.

In the first table of equivalents or proportions which we give below, we state the oils and fatty matters which we prefer to use in making the soft curd soap, and also the strength and quantity of the soda leys which we deem to be best adapted for the speedy saponification of such oils and fatty matters. The neutral soap, which has not been deprived of its water, is a soap which retains in its constitution the soda leys, or soda and water, employed in its manufacture, which not being separated therefrom is in a hydrated state and may be called a hydrated soap.

In calling this soap neutral it must be understood that we mean that it shall be made of fatty or oily matters and soda leys, in such proportions that they may be effectually saponified or combined by means of boiling or heat, so as to make a soap or combination in which neither the fatty or oily matter nor the alkali shall be materially in excess.

This hydrated soap we make by saponifying oils or fatty matters, or combinations of oils and fatty matters, by means of soda leys, in manner hereinafter described, so as not to contain too much water of hydration to make, when combined with the soft curd soap to be used, a soap of the degree of hardness which we desire to produce. In making hydrated neutral soaps we have found that it is necessary to avoid using the soda leys of too great strength, for if the leys be too strong the soap will not be neutral; and it is desirable not to use the leys any weaker than shall be necessary, because the soap made with weak leys would contain too much water of hydration to allow it to be applicable in the manufacture of hard soap.

In the second table, which we give below, we mention those fatty matters we have found to be best adapted, either separately or in combination, for producing hydrated neutral soap; also the strength of leys which we have found to be most useful in converting each of such fatty matters

into hydrated neutral soap, and also the quantity of such leys which we deem to be requisite for that purpose.

In making the curd soap for the purposes of our invention, we place the mixture of fatty or oily matters and soda leys in soap pans or vessels of the ordinary or any other suitable description, and apply heat in any usual or convenient way, and when the proportions of fatty or oily matters and soda leys mentioned in the first table are adopted, we have found the process of producing the curd soap to be much more rapid than when making it with fatty matters and soda leys in the ordinary manner.

We have mentioned soft curd because, for the purpose of our invention, it is not necessary to convert the soft curd into a finished soap of any description, and we use it in the unfinished state because it is more economical so to do.

In making a hydrated soap, we place the mixture of fatty or oily matters and soda leys in a suitable pan or vessel, preferring one that presents a larger extent of heating surface than ordinary soap pans, and the mixture being heated to and maintained at a boiling temperature, we have found that under careful management the fatty or oily matters and soda leys will be combined in about two hours. The curd soap made as above described or otherwise, and the hydrated soap made in manner above described, we mix together in the proportions which we deem expedient for producing a soap of the required description, and in the description below, we show (by way of illustration) the proportions of soft curd and hydrated soaps which may be mixed together for producing several descriptions of soap.

We place the mixture in a suitable pan or vessel, preferring one that presents a considerable extent of heating surface, heated by a furnace, or fire, or steam in any usual or convenient manner. We apply a slow heat until the soft curd soap is dissolved and thoroughly incorporated with the hydrated soap, and then increase the temperature until the contents of the pan begin to boil; afterwards we remove the greater part of the fire, or shut off a portion of the steam, in order to prevent any further increase of the temperature, and we continue the boiling by the application of a moderate heat until the materials are thoroughly combined, when the soap which will be formed may be removed to the soap frames; but we prefer to keep the

soap hot (by covering it) without crutching it for as long as may be convenient. Resinous and other matters, which are commonly used in soap making, may also be used in making the soap or saponified matters above mentioned.

Our said invention consists,—

Secondly, of a mode of combining resin or resinous substances with alkali, or alkaline leys, so as to obtain saponified resin, or a combination of resin and alkali to be used in the manufacture of resin soap.

In order to effect this combination, we first mix a portion, say about one-third part of the resin which we intend to use, with a small quantity of fatty matter, and we find that a quantity equal to from six to ten per cent. of the entire quantity of resin or resinous substances to be saponified is sufficient. A similar proportion, say one-third of the alkaline leys, is also mixed with the resin, and the mixture is then slowly melted. The remainder of the resinous substance is then added gradually by small quantities at a time, as the added portions become melted, and when the entire quantity has been melted we add the residue of the alkaline leys. Increased heat is then applied until the material boils, and this is continued until the saponification of the whole of the mass has been effected, when it will have assumed an appearance or consistence somewhat similar to thick glue or paste, and this effect may be produced, under the application of heat in manner above described, and careful management, in about three hours. We then separate the saponified resin from the excess of leys and water by means of salt or concentrated leys in the same manner as hereinbefore mentioned with respect to saponified fatty matters, and thus obtain the saponified resin in the state of soft curd. In saponifying resin in this way, it is deprived of much of its peculiar smell, and is considerably bleached, and the soft resinous curd soap which is obtained is adapted for being mixed with other soaps. In saponifying resin or resinous substances in this way, we deem it necessary to use an easily manageable fire, or steam heating apparatus, which can be effectually controlled, in order to regulate the temperature.

For the purpose of exemplifying the application of our invention in the manufacture of various kinds of soaps (similar to soaps in ordinary use), we will proceed to mention how soft curd soap obtained by the saponification of

fatty matters may be combined with neutral hydrated soap for that purpose, either with or without admixture with other ingredients, and also how saponified resin may be combined with other soaps.

To make mottled soap, we take a known quantity of tallow, fatty matter, or bleached palm oil, and boil it with sufficient soda leys to produce saponification, and then obtain the saponified fatty matters in the state of soft curd, as before mentioned; at the same time we prepare in another soap pan the hydrated soap, which may be formed of any of the oils or fatty matters mentioned in the second table of equivalents or proportions, either singly or in combination.

For a combination of oils or fatty matters to be used in making this soap, we prefer to use cocoa-nut oil, tallow, and lard, in the proportions of about eighty per cent. of cocoanut oil, fourteen per cent. of tallow, and six per cent. of lard. The quantity of leys to be used for the saponification of these oils and fats, either singly or in combination, should be carefully calculated by means of the second table, in order that a suitable hydrated soap may be formed; we then transfer the curd soap to the soap pan containing the hydrated soap made as last described, and boil both soaps together by means of a slow fire until they are perfectly united, and an appearance is presented of a soap finished in the ordinary manner. A mottle may be produced in this soap by adding to it, when in a finished state, colouring matter, to impart to the mottle such colour as may be desired, in the usual way; in about half an hour after the soaps and colouring matter have been thoroughly incorporated, the soap may be transferred to the frames. To manufacture the best descriptions of mottled soaps, we use a quantity or weight of oil or fatty matter converted into hydrated soap equal to from one-fourth to one-half of the oil or fatty matters used in making the curd soap intended to be combined with it, and for cheaper descriptions of soap the proportion of hydrated soap may be increased to proportions in which the oil or fatty matter converted into hydrated soap shall be equal to from two-thirds to one and a-half of the weight of oil and fatty matter used to make the curd soap.

To make white soap we use a combination of tallow, oils, and fats, to form both the curd soap and the hydrated soap,

and mix them together, as indicated in the process for making mottled soap.

To prepare a soap similar to that made from tallow and resin, and known in the trade as "pale soap," we put into the soap pan two-thirds of the entire quantity of tallow intended to be used in the operation, and then add about one-third of the quantity of ley calculated to be required for its saponification; a slow heat must be applied; and when the tallow and leys have united, a quantity of resin saponified, as herein-before described, must be added to the soap under the process of manufacture. We do not confine ourselves to any proportion, but prefer to use for the better qualities of pale soap, saponified resin, in the proportion of one-third to the weight of tallow used in making the soap. When the tallow, leys, and saponified resin are thoroughly united, we add the remainder of the leys, gradually increasing the heat at the same time, until the whole of the calculated quantity is used. After saponification, the excess of leys and water is separated in the usual manner, and the mixture of tallow and resin soap obtained in the state of soft curd. In another soap pan we make the hydrated soap by saponifying the remaining quantity of tallow, that is, the third part left from the first operation by using soda leys, of the strength and in the quantity which may be ascertained by reference to the said second table of equivalents, and into the pan containing such hydrated tallow soap we transfer the soft curd of resin and tallow soap, made as already mentioned. And after boiling the mixture together for about two hours, the soaps will become thoroughly united, and the compound soap will have assumed the appearance similar to the ordinary soaps in process of finishing. The soap should be removed to the frames within two or three hours after it is finished, and the frames should be covered so as to retain the heat as long as practicable.

To make a palm oil and resin soap, similar to that known in the trade as "crown soap," we prepare a curd soap from palm oil and resin in a similar manner to that described in making "pale soap" from tallow and resin, the weight of the leys required for palm oil being ascertained by reference to the first table of equivalents. In another soap pan we form a hydrated soap by saponifying a quantity of palm oil or tallow, equal to one-third of the

weight of palm oil firstly used for the curd soap, by using leys of the strength, and in the quantity which may be ascertained by means of the second table of equivalents; and to such hydrated soap we add the palm oil and resin curd soap, and proceed in the completion of this soap in like manner as in the production of tallow pale soap above described.

To manufacture soaps at a reduced cost, we use a greater proportion of saponified resin curd for admixture with the curd soap obtained from fatty matters, or we use a greater proportion of hydrated soap in proportion to the curd soap used. When the curd soap to be combined with a hydrated soap contains any excess of fatty or oily matters, so that the combination of the two soaps would not produce a neutral soap, we add such a quantity of leys to the hydrated soap, or to the mixture, as will make the combination neutral.

In the preparation of soda leys, we prefer to use soda ash, of the strength containing from forty to forty-eight per cent. of pure soda, and to every one hundred pounds of such soda ash we use sixty-five to seventy pounds of freshly calcined lime, slacked in its own weight of water, and one thousand pounds of water to dissolve the soda ash.

We slack the lime firstly, and then add the required weight of water, and when the lime and water have been thoroughly mixed, we add the soda ash. We employ free steam, blown through the mixture of water, lime, and soda ash, in order to boil it, and to assist in the operation, of rendering the leys caustic. The leys produced from the above proportions of materials will be of the specific gravity of 11° Beaumé's hydrometer. Stronger leys may be produced by using less proportions of water, or larger proportions of soda ash in the quantities necessary to produce the leys desired.

In the following table of equivalents or proportions, we state the oils and fatty matters we prefer to use for making the soft curd soap, and the strength of soda leys (as indicated by Beaumé's hydrometer), and the quantities of the same which we deem to be best adapted for speedily effecting the saponification of such fatty matter, such quantities being stated in degrees of Beaumé's hydrometer with reference to a combination with one hundred pounds of each fatty matter, so that the number of pounds of leys required for the saponification of any particular fatty matter may be

ascertained by dividing such number of degrees by the strength of the leys stated to be applicable to such fatty matter, and the quotient will be the number of pounds of leys required to be used to saponify one hundred pounds of fatty matter.

First Table of Equivalents or Proportions above mentioned.

Fatty matters to be used.	Quantities of leys in degrees of Beaumé's hydrometer.	Strength of leys in degrees of Beaumé's hydrometer.
100 lbs. tallow, require .	3,800°	14° to 15°
100 lbs. palm oil, require .	3,200	16° to 18°
100 lbs. tallow oleine, require	2,800	16° to 18°
100 lbs resin, require . .	2,700	16° to 22°

In the next table of equivalents or proportions we state the oils and fatty matters we prefer to use in making the hydrated soaps, and the strength of soda leys (as indicated by Beaumé's hydrometer), and the quantities of the same which we prefer to use in converting such fatty matters into hydrated soap, such quantities being stated in degrees of Beaumé's hydrometer, with reference to a combination with 100 lbs. of any fatty matter intended to be used, so that the number of pounds of leys required for the saponification of any fatty matter may be ascertained by dividing such number of degrees by the strength of the leys stated to be applicable to such fatty matter, and the quotient will be the number of pounds of leys required to be used to saponify one hundred pounds of fatty matter.

The Second Table of Equivalents or Proportions above mentioned.

Fatty matters to be used.	Quantities of leys in degrees of Beaumé's hydrometer.	Strength of leys in degrees of Beaumé's hydrometer.
100 lbs. tallow, require .	3,800°	11°
100 lbs. cocoa-nut oil . .	4,100	16° to 20°
100 lbs. palm oil . . .	3,200	18° to 22°
100 lbs. lard . . .	3,400	13°
100 lbs. tallow oleine . .	2,800	18° to 22°
100 lbs. olive oil . . .	3,000	16°
100 lbs. rape-seed oil . .	2,400	24° to 28°
100 lbs. linseed oil . .	2,400	24° to 28°

To give an example of the mode in which to calculate the quantity of leys required for an operation, we take that

first mentioned for the manufacture of mottled soap, assuming palm oil to be used to form the curd soap. On referring to the first table of proportions, it appears that one hundred pounds of palm oil require 3,200 degrees of leys, which may be of a strength of from 16° to 18° of Beaumé's hydrometer. This number of degrees—viz., 3,200—is divided by the number of degrees of the strength of the leys intended to be used, and if the strength be sixteen degrees Beaumé, the three thousand two hundred degrees must be divided by sixteen, and the quotient will represent the number of pounds' weight of leys of the strength of sixteen degrees required for the saponification of one hundred pounds palm oil. If leys of sixteen degrees be used, the proportion will stand thus, $\frac{3200}{16}$ = two hundred pounds' weight of leys of sixteen degrees strength required to saponify one hundred pounds of palm oil. If leys of eighteen degrees be used, $\frac{3200}{18}$ = one hundred and seventy-seven pounds' weight of leys of eighteen degrees strength required to saponify one hundred pounds of palm oil. Reference is then to be made to the second table of proportions, in order to ascertain the quantities and strength of leys required to saponify the several fats above mentioned which are to be used in producing the hydrated soap. For cocoa-nut oil, either of the two different strengths of leys 16° or 20°, mentioned in the second table of proportions, may be used. The quantities of leys required may be stated as follows:—

For 80 lbs. cocoa-nut oil,	if leys of 16° be used, we take the proportion,	as 100 lbs. : $\frac{4100}{16}$: : 80 c. n. oil : 205 = lbs. weight of leys 16°.
For 80 lbs. c. n. oil,	if leys of 20° be used, we say,	as 100 : $\frac{4100}{20}$: : 80 : 164 = lbs. weight of leys 20°.
For 14 lbs. tallow,	we take the proportion,	as 100 : $\frac{3800}{11}$: : 14 : 48 = lbs. weight of leys 11°.
For 6 lbs. lard,	we take the proportion,	as 100 : $\frac{3400}{13}$: : 6 : $15\frac{1}{2}$ = lbs. weight of leys 13°.

Having now particularly described the nature of our said invention, and the manner in which it is to be performed, we declare that we claim as of our invention,—

Firstly, the manufacture of soap by combining curd with hydrated soap, and also the manufacture of hydrated soaps in manner hereinbefore described.

Secondly, the mode of saponifying resin, or similar resin-

ous matter, by mixing it with a small portion of fatty matter, and treating it with alkaline leys in manner hereinbefore described.—In witness, &c. JAMES BLAKE.
FRANCIS MAXWELL

Specification of the Patent granted to CHARLES DURAND GARDISSAL, *of* 10, *Bedford-street, Strand, London, and of* 29, *Boulevart St. Martin, Paris, for A New Manufacture of Artificial Fuel.*—Dated August 28, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention relates to the manufacture of a new combustible composed of clay, coal dust, and a nitrate, or of nitric acid. The essential base of this combustible is clay and marl, or a mixture of the two in the proportions hereinafter described; this base is worked up with a solution of alum, a certain quantity of nitrate of soda or nitrate of potash, and the detritus or dust of charcoal or other coal, the largest particles of which should not exceed the size of small peas. All the materials foreign to the clay combine with and are diffused throughout the whole mass in a proportion of about seventeen per cent. of the whole mass. It results, therefore, that this mass of combustible material is formed principally of clay, which distinguishes it from all those in which the presence of clay serves merely to combine or agglomerate the combustible parts.

Although all kinds of clays and marls may be used for the composition of this combustible production, it is preferable that the clayey mass should be of the following composition:—

Of alumnia	fifty-five parts,
Of silica	forty parts,
And of lime	five parts.

It is always possible to find and form clayey earths which present this mixture by adding the necessary quantity of lime.

The proportions entering into the formation of this combustible are, by weight, as follows:—

Clay	eighty-three parts.
Alum	one and half parts.
Detritus of coal . . .	fifteen parts.
Nitrate of soda, or of potash, or nitric acid	one-half part.

The clay must be exposed to the air in summer, and in a stove in winter, till it has entirely lost its quarry water; it it is then worked up and sifted, and afterwards mixed intimately with coal dust; after the coal dust is properly incorporated, it is worked up a second time with a solution of alum containing a quantity of nitrate in the proportion hereinbefore given. One part in weight of water added to the clay is sufficient to render the material sufficiently plastic for the purpose. When the mixture has become homogeneous, it may be moulded into bricks either by hand or by a machine. The moulded product is dried in a stove or on drying frames in the open air, according to the season. When dry, the combustible bricks are fit for use.

In burning ordinary bricks, by means of these combustible materials, they are placed in the ovens, kilns, or piles of bricks in the position where fires are required in the mass of bricks to be baked or burned; these combustible bricks not only bake or burn the others, but they bake themselves, and are removed from the oven or mass in a state of perfect but porous bricks, which may be used as ordinary bricks.

Although I have specified bricks alone, it must be understood that the same process applies to the manufacture of tiles, drain pipes, or other ceramic or earthenware manufacture. It will be readily understood that these combustible materials may be equally distributed and numerously diffused through the mass of bricks or other articles to be baked or burned, which conduces to the perfect and uniform baking or burning of the whole.

This improved combustible can be used for various heating purposes, such as for heating bakers' ovens, baths for dyeing, the manufacture of chemical productions of lime, &c., one of its advantages being that it burns as slowly as may be wished.

Having described the nature of this invention and the manner in which it may be performed, I declare that what I claim as the invention to be protected by the hereinbefore in part recited letters patent is,—

First, the manufacture of bricks, tiles, drain pipes, or other earthenware or ceramic manufactures of combustible material, as hereinbefore described, serving as a combustible or fuel for baking or burning a manufacture of the same or other kinds, and forming after complete combustion a brick, tile, drain pipe, or other article of itself.

Secondly, the manufacture and use of combustible material, as hereinbefore described, for all other purposes for which it may be applicable as a fuel.—In witness, &c.

CHARLES DURAND GARDISSAL.

Specification of the Patent granted to CHARLES DURAND GARDISSAL, *of* 10, *Bedford-street, Strand, London, and of* 29, *Boulevart St. Martin, Paris, for A mode of Treating and Preparing Sea Weeds or Marine Plants for Manure.* —Dated August 28, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—This invention relates to the treatment of sea weeds, or marine plants of any kind, whereby those matters are rendered applicable as a manure, and reduced to a condition which renders them readily capable of being transported from the place where they are collected to the locality in which they are to be applied as manure, or for the purpose of obtaining salts therefrom to be used as a manure. The weeds are collected and subjected to a great pressure, whereby their bulk is reduced and rendered in the form of balls or cakes. This process of compression may either take place while the plants are in a wet mucilaginous state, or after having been previously dried, the mucilage and chloride of sodium being left on the plants.

In either case the compression of these matters may be effected in the cold state, or they may be previously heated and softened by a jet of steam, hot water, or other suitable heating medium.

Instead of proceeding as above, the sea weeds may be collected, and while in a wet state, or after having been dried, are reduced by cutting or crushing machinery of a suitable kind. The pulp produced is then condensed by pressure, and reduced to the form of cakes, in which condition it is easily capable of transport. The pressure may be applied to the pulp in a cold state, or after it has been heated or softened by heat or hot water.

Having described the nature of my invention, and the manner in which it may be performed, I desire it to be understood that what I claim as my invention, protected by

the hereinbefore in part recited letters patent, is, treating and preparing, as hereinbefore described, sea weeds or marine plants to be used as manure.—In witness, &c.

CHARLES DURAND GARDISSAL.

Specification of the Patent granted to GEORGE WARRINER, *of Withernsea, in the County of York, Operative Chemist, for Improvements in Compounds for Preserving, Deodorizing, and Fertilizing.*—Dated August 25, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists,—

Firstly, in the use and application, for the preservation of meat, fish, fowl, vegetable and animal substances, of a compound of what is termed glycerine, or sugar of fat, (or of any substance or substances having the same attributes as glycerine or sugar of fat, such as elaines, oils, treacle, when in such a state as not to be liable to oxidation,) in combination with certain substances, viz., water, alcohol, vegetable, animal, and mineral oils, or oleaginous substances, and gelatine, gelatinous substances, and osmazome, one or more of them, as the case may be. To which, in some cases, may be added charcoal, or other carbonaceous substances, lime and ammonia, or some, or one of them. In carrying out this part of this invention, I proceed as follows:—

For all alimentary substances, I first subject such substances to a vacuum in a close vessel, produced by an air pump or other suitable means, for a longer or shorter period, according to the size of the thing under treatment whilst in vacuo. I cover it with glycerine mixed with either water and common salt, or alcohol, or gelatine, or osmazome, varying these according to the thing to be preserved, animal flesh or "butchers' meat" requiring more glycerine than fowls, fish, or vegetables. When properly impregnated with the above, I pack the thing so treated in casks, cases, or tins, with some of the above mixture; or I dry them by any known plan, and cover them with either cloth, skin, bladder, tinfoil, osmazome, and glycerine, or gelatine and glycerine, and pack them in casks or boxes with powdered "bog-head" charcoal produced in close retorts, or

other carbonaceous or antiseptic substances, or in melted fat mixed with glycerine, or in air-tight cases. And the meats may be cooked previous to packing.

To illustrate the manner of performing my invention, I will mention a leg of mutton. I take the leg of mutton, and I break the knuckle bone; I cut round the chump bone, and make a small cut with a fine saw into the leg bone; I, then, with a very fine pointed silver skewer, make an incision as far as the kernel, or "pope's eye," and insert a quill, cut open at both ends, into the hole thus made. I then place the leg of mutton into a covered trough, or iron pan, or any vessel that is air-tight, and to which is attached a mercury gauge, at least twenty-nine inches long. I then procure a vacuum, either by an air pump, or any other means, and maintain it until the mercury rises and remains at twenty-eight inches for one hour at least. I then admit the preservative or antiseptic liquid mixture hereafter described by a small hole with a tap, until the meat is covered, keeping up the vacuum in the mean time, and allowing it to remain in the vacuum for about one hour. Or in summer, and very hot weather, I proceed by making a liquid mixture, such as above described, and I immerse the thing to be treated in it in an air-tight vessel, and I press out all the liquor, and allow it to remain in vacuuo; and when I am ready to proceed with the process, I add fresh liquor, and proceed as hereinbefore described.

This liquid mixture I produce thus:—I take the blood of the animal subject, when it has just been killed, and the juices of the vegetable or fruit, and try their specific gravity by any hydrometer. I do this, because the blood and juices of all animals, fowls, fish, fruit, and vegetables differ in their specific gravity, even in the same animal at different ages. I then take of pure distilled glycerine, made from any fatty matters, sufficient, when added to water, to make it two-thirds of the specific gravity of the blood; the remaining third part, or a little more in weight, (for I prefer the liquid to be slightly heavier than the blood or juice,) I make heavier, either by salt or by the concentrated essence of the meat, or gelatine, according to the object or taste of the parties requiring it. In some cases with vinegar, and in others with pyroligueous acid; as for instance, herrings are good with glycerine and water alone, or with glycerine and water combined without salt, when they will eat as fresh herrings when cooked; but for

bloaters, I add a small quantity of salt, according to taste, but for highly dried herrings, I add pyroligneous acid, or Westphalia essence, according to taste; and in some cases, where the flavour of onions, or garlic, or any aromatic herb is approved of, I add the essences of those roots or herbs. I then pack the thing treated as above in casks, with some of the fresh liquid, made as before; but care must be taken that, after so packed, the cask be full of liquid, and that it should not be exposed to too great a heat, so that the albumen and osmazome of the meat become extracted into the liquid, for it differs from salt very essentially, the salt causing the fibrine and albumen to become hard, whilst this liquid keeps the fibrine soft.

As, in some cases, very delicate things have to be preserved, such as sweetbreads, lambs' fry, or that which is known as fowl's ragout, veal cutlets, &c., I prefer, when the air is extracted, to add to a sufficient quantity of the melted fat of the animal or fowl which I am preserving a similar quantity of glycerine as I would have added had the melted fat been water, and to apply it to the thing to be preserved, so that it is covered, and thus preserved. I keep it immersed till required for use.

For poultry, I prefer to have the fowl or bird properly trussed, the leg bone broken, a few puncturations made in the broken part of the leg by a larding needle, and, if larded, the fat should have been subjected previously to the above mentioned process. To save room the fowl might be dressed as for boiling, and in that way packed, in which case I would use fat to immerse it in, with pieces of bacon between each fowl.

In some cases I cook these things previously; for instance, quenells of all kinds, either decorated or not decorated, cutlets decorated, calves' heads for "made dishes," ox palates, calves' brains, and similar things too numerous to mention, but required in first-rate cookery; these I either surround with melted fat or a very strong jelly made with glycerine. For very choice fruit I likewise immerse and pack in a similar jelly.

As there may be difficulties at times existing in carrying a weight of liquid for preserving when drying would answer the purpose, I add in such cases to the thing to be preserved, at the time the vacuum is formed, a strong jelly made from glycerine, gelatine, and essence of the meat,

fish, fowl, or vegetable without salt, to be added very hot, and when taken out to be hung in a drying chamber varying from 80 degrees to 120 degrees Fahrenheit, until fit to pack. When dry, I cover it either with skin, bladder, gutta percha, or tin foil, or any similar substance, and place the same in a box, case, or cask, containing finely powdered "bog-head" charcoal, produced in close retorts impregnated with glycerine, and highly dried, or any other well-known carbonaceous and antiseptic substances; or I bone the meat, and subject it to a great pressure after it is dried, and pack it as before. When cooked, I prefer to soak it in a liquid made from the osmazome of the meat by the ordinary chemical process of making osmazome.

In order to save space in the preservation of vegetables, I prefer, after they have been subjected to the process before described, to dry them by any known or suitable process; but I prefer that described by John Greefer, in his patent No. 1275, Anno Domini 1780, and then subject them to pressure by any known means; but I prefer that method described by Vallence in his patent No. 4480, Anno Domini 1820.

There are some occasions, as with some kinds of wild fowl, where the slightest flavour of sweetness resulting from the glycerine would be objectionable; in such cases I mix a small quantity of alcohol or spirits, such as the rectifiers use, along with the glycerine and gelatine, and adopt the vacuum process hereinbefore described, when required, and immerse the same in the jelly thus made; and in some cases with particular kinds of fish wished to be preserved raw, I mix the glycerine with either fish or vegetable oils, and use the same as before indicated.

With some raw vegetable, mushrooms, for instance, I impart an acid flavour, either with juice of lemons or vinegar, and before submitting them to the action of the glycerine, but very slightly, so that the whiteness to be preserved be retained.

For milk or cream, either to use alone, or to make into butter or cheese, I make a mixture of glycerine, with a small quantity of carbonate of soda, half an ounce to one gallon of milk, so that when mixed with the milk it shall be of the same specific gravity as the blood of the animal before described, and I place it in a vessel, into which the milk is coming from the cow; I then put the milk into

bottles, and cork them by tying down the corks, and place them in a vessel of water, and subject them to a boiling heat for a short time; ten minutes, for instance.

For eggs, I make a mixture of gelatine and glycerine of the specific gravity that an egg can float in, which I find to be the same specific gravity as the whites of eggs just broken. I either immerse them in this liquid, or coat them with it, and pack in dry powdered bog-head charcoal.

For hides, I place them in a mixture of glycerine, water, and salt, and allow them to remain for some days previous to packing or drying them.

For seeds and bulbous roots intended for agricultural or horticultural purposes, in order to preserve them for removal to distant countries, or to preserve them from too great a desiccation and restore their vitality, I make a mixture composed of half glycerine and half powdered charcoal, and coat the surfaces with the same and pack them in this substance; I also use it for covering all seeds and roots previous to sowing or planting, to prevent them being destroyed by birds or vermin, and for stimulating their growth.

For preserving animal, fish, and vegetable matters to be thereafter used for manure or other purposes, I immerse them in a strong liquid of glycerine and water, double the specific gravity of that used for eatables, and after a week or more take them out, and pack them in casks, with some of the liquid on the top; they will thus preserve all their ammonia and gases until such time as they are placed on the land, pulverized or not; or I make a mixture of the powdered charcoal (as before described) with glycerine, and cover the matters with it, and thus pack it.

Secondly, as to that part of my invention which consists in improvements in compounds for deodorising.

For purifying water or other impure liquids, deodorizing and preventing its decomposing and putrefaction, I make a mixture of glycerine and charcoal, powdered or not, and mix it with the water, or allow it to filter through it, for which purpose it can be used to purify the waste water of a farmyard, house, or town, so as to combine or absorb the ammonia that may be in the said water, and use it for manure.

The quantities of glycerine and charcoal depend entirely on the nature of the water; that having a slight smell, but

muddy, will take but a small quantity of glycerine but more charcoal, whilst that having a very putrid smell, but not muddy, will take more glycerine and less charcoal. As water must vary continually, it is impossible to give an exact formula on which to act; but I have found that for the first-named waters one pound avoirdupois of charcoal to half an ounce of glycerine is sufficient, and for the last-named waters one pound avoirdupois of charcoal, and two ounces of glycerine, is sufficient.

For deodorizing and purifying impure air, I make a mixture of powdered charcoal, with a small quantity of gelatine or gummy substance, if required, and give it any scent with essences or essential oils or acids from either plants, flowers, shrubs, fruits, or vegetables, and form them into cakes or cones, or any shapes convenient to burn like pastiles, and burn the same where impure air exists.

And, thirdly, improvements in compounds for fertilizing; and to prevent the ill effects arising from the too rapid decomposition of animal matters, and the escape of the ammonia into the atmosphere, I make a mixture of glycerine and charcoal, powdered or not, which charcoal I prefer to procure from the bog-head coal produced in close retorts, but also use that from schale, alumina, waste shells, lime, turf, or wood; I also use it to mix with other well-known manures, in order to fix the ammonia and increase their utility, and likewise as a fertilizer of the soil; as, for example, I make a mixture of charcoal and glycerine, eighty-four parts in measure of charcoal to sixteen parts in measure of glycerine; with this I cover the dung-heap, consisting of any matters, as stable manures, night soil, &c., which will give off ammonia, by which covering it is prevented escaping; and with other manures that are too strong to use to the land alone, such as guano, sulphate and muriate of ammonia, carbonate, sulphate, and nitrate of potash, nitrate and sulphate of soda, superphosphate of lime and other phosphates, common sulphur, and nitrogenous substances, I mix the glycerine and charcoal in the above proportions, according to the strength of the manure; as, for example, I mix with the ordinary Peruvian guano from five to six bushels of the mixture to one bushel of guano; and as a fertilizer alone, I use on an average twenty bushels of the compound to the acre; the charcoal

being thus mixed remains moist, combines with the oxygen and carbon of the atmosphere, and emits carbonic acid.

There are some flowering shrubs and other things which require added to the charcoal a greater amount of glycerine or glycerated water as it comes from the soap-boilers or stearine makers; amongst these are pine apples, melons, cucumbers, pumpkins, vegetable marrows, and onions; also roses, rhododendrons, hydrangeas, camelias, and orchidaceous plants.

To prevent the disease of the potato as well as the grape and the hop, I mix with the above compound powdered sulphur or the refuse of any chemical works where sulphur is used in a powdered state, in proportions of one-eighth part of pure sulphur to one of charcoal and glycerine; these I prefer placing near the roots of the plant; or I mix the sulphur with the glycerated water, in average proportions of one-eighth of sulphur to one part of glycerated water, and syringe the vine or hop, or haulme of the potato, or any shrub or plant exhibiting a somewhat similar disease; or for turnips or such like roots, I use it in a state of liquid, mixed with the ammoniacal liquor from the gas works or any other made ammoniacal liquor, in the proportion of one-eighth of ammoniacal liquor to one part of glycerine mixed with three parts of water, sometimes mixing sulphur with it; and I use this with the water drill, or watering pot or syringe, for standard and wall trees and shrubs.

Having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I do not claim the immersion of substances in glycerine, that having been already used; but I claim as my invention the improvements in compounds with glycerine for preserving, described as the first part of my invention; also the improvements in compounds with glycerine for deodorizing, described as the second part of my invention; and likewise the improvements in compounds with glycerine for fertilizing, as herein-before described, as the third part of my said invention.—In witness, &c.,

GEORGE WARRINER.

Specification of the Patent granted to RICHARD ARCHIBALD BROOMAN, *of Fleet-street, in the City of London, for An Improved Fermenting Agent.*—Dated the 11th August, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.—The nature of this invention consists in making use of the investing matter or covering of the cereal grains, which, when ground, is called bran, instead of the materials usually employed in making yeast, some of which the inventor has found to be positively injurious.

This invention is based on the well-known fact that if we take a kernel of a cereal grain, the delicately balanced matter known as albuminous matter, the protein compound allied to flesh and the grain, exists in the largest proportion in and next the covering. When such grain is ground and bolted, the covering and contiguous parts are rejected as articles of food under the form of bran. As all diseases and chemical changes proceed from this covering towards the centre of the grain, it occurred to the inventor that the bran of the cereals would ferment sooner than any other part of the grain would do, and experiments fully proved that such a change is more easily induced and proceeds with more regularity than when we use flour free from bran, or in part mixed with it. The bran, after the action of fermentation has commenced, becomes broken up by new chemical arrangements, and the true vinous fermentation proceeds for several days. The addition of flour, and especially impure gluten, to the bran retards fermentation, and tends to produce putrefaction or animal matter fermentation, while the vinous fermentation of the pure bran shows no such tendency, the final result being the acetous fermentation only. When we use pure bran, fermentation commences after twenty-four to thirty hours, while ordinary flour by the same treatment requires one hundred and sixty-eight to one hundred and ninety-two hours' time before it reaches the same stage. The spores of the yeast plant existing in the covering of the grain are retained by the bran, very few passing in to the flour. The yeast, therefore, changes grape or sugar uniformly into alcohol without risk of the acetous or putrefactive fermentation, and the mash for beer or spirits thus affords more alcohol than is usually obtained.

I proceed to describe the method of making this improved

fermenting agent or yeast. I take bran of wheat, as rejected by the bolting machine, and having placed it in a warm room at eighty-five degrees Fahrenheit, I mix it uniformly to a thick paste with water at eighty-five or ninety degrees Fahrenheit, and cover the vessel close. After the lapse of thirty hours, or generally after twenty-four hours, the bran is converted into yeast. I use and prefer the bran of wheat in all cases. When, as in beer-making, and in manufacturing spirits, a continuous pure vinous fermentation is desirable, and when the yeast is added to the mash or mixture of sugar and water, I advise the yeast to be stirred in frequently during the twenty-four hours. In bread-making, and other cases, bran of rye or maize may be substituted for wheat bran.

The inventor is aware that barm and yeast have been rendered dry and portable by the use of bran and sawdust mixed with the fluid yeast, and also that yeast and dry flour have been mixed to retard fermentation. Both these results I disclaim, and confine this invention to the use of pure bran for obtaining a better fermenting agent or yeast for the vinous fermentation at a lower cost than heretofore.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that what I claim is, the employment of bran of the cereal grain for producing a fermenting agent or yeast without the aid of the flour as usually obtained from such grains.—In witness, &c.,

R. A. BROOMAN.

Specification of the Patent granted to LEONARD ALEXANDER DESACHY, *of Great Marlborough-street, in the County of Middlesex, for Improvements in producing Architectural Mouldings, Ornaments, and other Works of Art, formed with Surfaces of Plaster or Cement.*— Dated October 23, 1856.

To all to whom these presents shall come, &c., &c.— This invention has for its object improvements in producing architectural mouldings, ornaments, and other works of art formed with surfaces of plaster or cement. For these purposes the plaster or cement, in a sufficiently fluid state,

is applied to the interior surface of the mould, so as to produce a thin coating therein; and whilst the plaster or cement is still plastic, or moist, a coating of one or more pieces of canvas, or suitable woven fabric, is applied to the interior surface of the plaster or cement so as to adhere thereto. Size, glue, or oil, being used to aid the adhesion of the canvas or woven fabric to the plaster or cement when required. In cases where greater strength is required, two or more layers of canvas or woven fabric are used, cemented together, one on the other in the mould by the aid of size, glue, or suitable cementing material. To facilitate the fixing of such moulded surfaces to other surfaces, wires are, when required, laid into and retained between the two or more layers of canvas or woven fabric. In place of the plaster or cement being introduced into a mould so as to thinly coat the interior, as above explained, when the article to be produced is a moulding or some other regular form, the canvas or fabric may be first fastened on to a block or shape, and the plaster or cement may be applied thereto; and the moulding then produced in like manner to that now pursued. Flat surfaces of plaster or cement strengthened with canvas may also be produced in the manner before described, for the formation of finishings to walls and ceilings of buildings, and for other works of art or utility. By these means the cement or plaster employed is only for producing the exterior surfaces, whilst the requisite strength and stiffness are obtained by the canvas or woven fabric. The articles thus produced will be very light, and comparatively of small cost.

Having thus stated the nature of my invention, I will proceed more fully to describe the manner of performing the same.

The mould from which it is required to take a cast will be prepared in the ordinary way usually employed for making casts in plaster. On the inner surface of the mould will then be laid a very thin coat of the plastic material to be employed; and whilst in the fluid state small strips of canvas or other fibrous material of a size proportioned to the cast required are applied, and pressed on to the surface of the mould with a brush, taking care to leave as small as possible a quantity of the fluid plaster, or other plastic material, next the surface of the mould; where additional strength is required, the operation may be again repeated by other strips of canvas, or other fabric, crossing

the first, and applied in the same way, by a brush dipped in the fluid plaster or other cement. Casts taken in this way will be found to possess greatly less weight than an ordinary plaster cast, whilst they have considerably increased strength, and are not liable to fracture by a sudden blow or pressure. Wire, or hooks, or pieces of wood, may be inserted whilst the plaster is in the fluid state and enveloped by the strips of canvas.

Mouldings of large size, or hollow beams of great strength, can also be made by running the plaster or other fluid material, or canvas, or other fabric, on a suitable form, and by producing thereon the desired ornamental surfaces in the ordinary manner.

In the formation of solid slabs, where great strength is required for ceilings or partitions, a thickness of plaster or other cement is floated over a perfectly level surface, and the canvas or other fibrous material then laid upon it, and on this again another surface of plaster may be floated, and when dry these slabs may be raised, and fixed in their places by nails, or screws, or otherwise, as readily as planks of wood.—In witness, &c.,

L. A. DESACHY.

Specification of the Patent granted to ANTHONY LORIMIER, *of Bedford-square East, Commercial-road, in the County of Middlesex, for An Improvement in Re-working Vulcanized India-rubber.*—Dated October 20, 1856.

To all to whom these presents shall come, &c., &c.—It is well known that what is called vulcanized india-rubber, after being made up and used, becomes a waste material. Various modes have been had recourse to for re-working such description of india-rubber, but, it is believed, with little success. Now, my improvement consists in preparing the pieces or waste of vulcanized india-rubber by crushing the same between pressing rollers, then subjecting it to a considerable degree of heat, and, whilst so heated, causing it to be stirred, by which means the mass is progressively brought into a fluid state. The mass is then allowed to cool; but, before becoming cold, a solvent of india-rubber is added, by which an india-rubber cement is produced, which may be used for spreading on fabrics

and surfaces for the purposes of rendering the same water and air proof.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The pieces or waste of vulcanized india-rubber are first passed through between a pair of strong pressing rollers with smooth surfaces, by which the pieces will be crushed and pressed into a thin sheet of a spongy character, which, on being folded together into several layers, will, on being passed again through between the pressing rollers, be reduced into a granular condition. I would remark that I am aware that india-rubber (more particularly the more common descriptions) has heretofore been passed between pressing and crushing rollers to facilitate the cleansing the india-rubber from impurities, but it is a new and an important part of my invention to subject vulcanized india-rubber to pressing or crushing rollers, in order to break the same down and to reduce it to sheets and into a granulated form. The granulated spongy india-rubber thus obtained from vulcanized india-rubber may be moulded into form or pressed into sheets by subjecting the same, whilst held compressed (with or without a small quantity of solvent or the vapour of solvent) in metal moulds or between plates, to heat, for which purpose boiling water, steam, or other heat may be employed. After the moulds or plates, and the india-rubber therein, have become thoroughly heated, the india-rubber is to be allowed to cool in the moulds or between the plates, when the articles produced will have become set and retain the character of vulcanized india-rubber. The vulcanized india-rubber, having been reduced into a granular state, as above explained, may be subjected to a high degree of heat in a suitable vessel, which I prefer to be of metal. The heating of the india-rubber is to be continued till the india-rubber is rendered plastic or semi-liquid, when the fire is to be drawn. The mass is to be kept stirred during the process of applying heat, and for some time after the fire has been drawn, in order that all parts may be similarly acted on by the heat, and I usually stir in a quantity of an ordinary solvent whilst the mass is still warm, in order to render the same more suitable for being spread on to fabrics for waterproofing purposes.

Or the more liquid preparation of the vulcanized india-

rubber may be obtained from the granulated spongy product above described by subjecting it to the action of heat and the vapour of a solvent, in which case so high a temperature will not be required as when reducing the granulated vulcanized india-rubber to a plastic or semi-fluid state by the action of heat alone, as above explained.

When heat and the vapour of a solvent are used, a much lower temperature will produce the desired result. For this purpose the granulated spongy vulcanized india-rubber is placed in a suitable vessel, whilst the solvent used is placed in an outer covered or closed vessel, which surrounds the vessel in which the india-rubber is placed. The heat is applied to the outer vessel, which heats the solvent therein, and also the inner vessel and the vulcanized india-rubber therein. When the whole have become heated, the solvent vapourizes, and the vapours pass into the inner vessel and fill the same, by which the vulcanized india-rubber will become more readily acted on by the heat, and it will take up such a quantity of the solvent as will simply soften it or render the mass liquid to the extent desired, and the same may be drawn off from the inner vessel by a tap at the bottom thereof which passes out of the outer vessel.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the re-working of vulcanized india-rubber by subjecting the same to the combined action of pressure between rollers and heat, as herein described. —In witness, &c.

ANTHONY LORIMIER.

Specification of the Patent granted to RICHARD ARCHIBALD BROOMAN, *of* 166, *Fleet-street, in the City of London, for A Method of Treating Guano and other Matters containing Uric Acid, and the Manufacture from the Products arising from such Treatment, as well as from Uric Acid, of New Colouring Matters, and the Fixing and Application thereof.*—Dated May 6, 1856.—(A communication.)

To all to whom these presents shall come, &c., &c.— This invention consists,—

Firstly, in the purification of guano and other matters

containing uric acid by means of acids, which dissolve all injurious matters and leave the uric acid mixed with insoluble and inoffensive matters. These purified agents are as fitted to be used in the manufacture of the various products arising from the oxidation of uric acid, as uric acid obtained by an expensive process from the same matters by means of alkalies.

Secondly, the invention consists in a new colouring product, which is termed "carmin de pourpre," and in the manufacture thereof, by evaporating solutions of uric acid, or of the purified products obtained, as before stated, in nitric acid or other oxidizing agents.

Thirdly, the invention consists in fixing upon threads, yarns, and fabrics, silk, wool, cotton, and other materials, by dyeing or printing, the above-named "carmin de pourpre," as well as other colouring matters obtained from the oxidation of uric acid, by means of certain metallic salts, such as salts of mercury, of zinc, &c., so as to form in the threads, yarns, and fabrics metallic purpurates ("purpurates"), and

Fourthly, the invention consists in the manufacture of metallic purpurates in a state of lac (laque) or coloured powder, and the application thereof upon paper and fabrics, and to painting.

I now proceed to describe the manner in which the first part of the said invention is carried into effect.

Guano, or other matter containing uric acid, is heated in suitable vessels with muriatic or other acid diluted with water, the action being assisted by heat; the matters are left to settle and the liquor run off; the same acid liquor is passed over fresh portions of the guano (supposing that to be the matter under treatment) till it is completely saturated. The first portion of guano is treated with a fresh supply of acid, then washed with water several successive times, allowed to drain, and then dried. The object of this operation is to dissolve the salts which are formed in the guano, viz., ammoniacal, carbonate and oxalate calcic magnesic, and ammoniaco-magnesic phosphates, calcic carbonate, &c., and also to decompose the alkaline urates. The matters thus treated now only contain uric acid combined with sand, calcic sulphate, and other insoluble bodies, and organic detritus (of a yellowish colour), and the substance obtained may be as advantageously employed as uric acid itself in the manufacture of

products resulting from the oxidation of this acid. The saturated hydrochloric liquors may be employed either as manure or ammoniacal salts; oxalic acid, &c., may be extracted therefrom. The mode of treatment just described for treating guano is applicable for other matters containing uric acid. Instead of employing muriatic acid, as herein-before described, for the purifying of guano or other matters containing uric acid, other acids answering the same purpose may be employed.

To carry the second part of the invention into effect, guano (or other matter containing uric acid), purified as herein-before described, is mixed with nitric acid in earthen vessels, portions of guano and acid being placed in the vessels alternately, and a little at a time (in order to avoid the raising of the temperature to too high a degree, and to moderate the effervescence of the liberated nitrous gases). The mixture is left to settle for some days, when a thick pasty substance will result, which is treated with warm water, filtered, and the residuum washed with warm water; the filtered liquor is of a yellowish or reddish colour; it may be decolourized by animal charcoal, which would retain the matters coloured yellow dissolved by the nitric acid. The liquor, either decolourized or not, is then a solution of uric acid in nitric acid, that is to say, it contains alloxan, alloxantin, urea, and various colourless products, resulting from the oxidation of uric acid. The liquor is next evaporated in any suitable manner in large iron vessels, enamelled or glazed on the inside, care being taken not to raise the liquors to boiling point. The solution is poured into these vessels a little at a time; that already in the vessel should arrive at a pasty consistency before adding a fresh supply, and the matters should be kept stirred all the time. When all the liquid has sufficiently evaporated, the contents of the vessel are left to cool down into a pasty or solid consistency; the product will be more or less solid, in proportion to the extent to which evaporation may have been carried. This pasty or solid substance is of a brownish red or violet colour, sometimes reflecting green rays, and the inventor designates it "carmin de pourpre."

In this operation the colourless products of the oxidation of uric acid being in presence of the ammoniacal salts, urea, ammoniacal nitrate, &c., combined with them in the nitric solution, and undergoing the action of heat, are converted

into reddish products, &c. Whatever be the mode adopted for evaporating, care should be taken that the matters should not accumulate in too large a quantity and should not reach boiling point. Instead of employing in the manufacture of this colouring matter guano purified by means of muriatic acid, as previously described, pure or impure uric acid of commerce or other solutions of uric acid may be employed for the purpose, and any other oxidating agent that will answer the purpose may be substituted for the nitric acid employed in the process.

I now proceed to describe the manner of carrying the third part of the invention into effect. In order to apply the colouring matter or "carmine de pourpre" to yarns, threads, and fabrics, and to fix it solidly thereon by means of dyeing and printing, metallic salts are used in such manner as to produce in the fibres insoluble metallic purpurates; the salts which have been found to yield the best results are salts of mercury for red, purple, and pink shades, and salts of zinc for yellow and buff shades. By these agents this colouring matter may be fixed in dyeing and printing on all descriptions of fibrous or filamentous materials and textile fabrics, whether in a natural state or oiled, as in the case of Turkey reds, whether such materials or fabrics be spun or not, woven or otherwise; also on flocks used for paper hangings or otherwise, feathers, artificial flowers, tanned and tawed skins and hides, employing any means known in dyeing and printing for combining on the fibre, fabric, or article to be dyed or printed a metallic base with a colouring matter. For example, the colouring matter may be applied by steeping or printing, and then fixed by the metallic salts, or the salts may be applied as mordants, and the article dyed with the colouring material; or the colouring material and the metallic salts may be combined in such manner as to produce a wholly or partially soluble preparation, and the fabrics may then be placed in contact therewith; thus, for example, to dye silks in shades of purple, pink, &c., a solution of bichloride of mercury should be mixed with a solution of "carmin de pourpre," and the silk steeped in the combined solution, which it will absorb, and take a fine shade, more or less dark, in proportion to the length of time it remains in the bath, and of the strength of the bath. To dye wools in shades of purple or pink, they should first receive a mordant of a salt of mercury, such as

bichloride of mercury, with oxalic acid added, mercurio-potassic, tartrate acid, sulphate of mercury. To these mordants or oxidating agents, such as chloride of lime, chlorine water, and bichloride of tin, &c., should be added, in order to maintain the mercury in a state of peroxide. When the wool has received the mordant and has been washed, it is dyed in a bath of "carmin de pourpre" alone or mixed with salts of alkaline metals, such as oxalate of soda, &c. In order to obtain shades of yellow, salts of zinc should be used instead of salts of mercury. For printing cottons, they should first be printed in acetate of mercury and zinc, then dyed in a solution of "carmin de pourpre" washed; the cotton would be printed in yellow and red, while the ground would remain white.

The method just described for fixing "carmin de pourpre" may also be applied to the fixing on matters to be dyed or printed of pure murexid (purpurate of ammonia), soluble purpurates (purpurate of soda, potassa, &c.), or any other colouring matter resulting from the oxidation of uric acid. The same mode may also be adopted for the fixing of the colourless products of the oxidation of uric acids, such as alloxan, or a simple solution of uric acid in nitric acid. On subjecting the dyed fabric to heat, by hot air or otherwise, it will acquire a red shade. In order to fix this colour and obtain fast reds and yellows, the fabric should be passed through a solution of salt of mercury or of zinc. These colouring matters may be satisfactorily applied to the dyeing of fabrics in designs or patterns, as they may be readily eaten away, and designs left in various shades (such as white, yellow, blue, green, grey, &c.) by means of chemical agents, and these shades readily combine with other known colouring matters, so that the fabric may be doubly dyed, and a variety of plain and figured patterns produced.

I now proceed to describe the manner of carrying the fourth part of the invention into effect. The "carmin de pourpre," murexid, and other colouring matters resulting from the oxidation of uric acid, treated with certain solutions of metallic salts, yield precipitates entirely or nearly insoluble (metallic purpurates), some of which possess much brilliancy. These precipitates, when dry, yield powders or lacs (laques) which might be advantageously employed in painting, and in printing paper-hangings and textile fabrics. Thus the precipitates obtained by means

of the acetate and nitrate of mercury, directly combined with the solution of "carmin de pourpre," and other colouring matters resulting from the oxidation of uric acid, and by means of bichloride of mercury mixed first with the aforesaid resulting colouring matters, and then precipitated by means of an alkaline salt, yield purples, violets, and pinks. Those obtained by means of salts of zinc, yield yellow, orange, &c.

And having now described the nature of the said invention, and in what manner the same is to be performed, I declare that I claim,—

First, the purification of guano and other matters containing uric acid, by means of muriatic or other acids, as hereinbefore described under the first head of this specification.

Secondly, the manufacture of the new colouring matter hereinbefore described, called "carmin de pourpre," by the evaporation of solutions of uric acid, or of the purified products obtained, as described under the first head of this specification, in nitric acid, or other equivalent oxidating agent, all as described under the second head of this specification.

Thirdly, the fixing upon threads, yarns, and fabrics, and textile and fibrous and filamentous materials, and raw and manufactured products, of the abovenamed "carmin de pourpre," as well as of other colouring matters obtained from the oxidation of uric acid, by means of metallic salts, as described under the third head of this specification; and,

Fourthly, the manufacture of purpurates in a state of powder and lac, from the combination of "carmin de pourpre," or other colouring matters, resulting from the oxidation of uric acid, with metallic salts, as described under the fourth head of this specification, and also the application of such lacs and powders to purposes of painting and printing paper-hangings and fabrics. — In witness, &c.

RICHARD ARCHIBALD BROOMAN.

SCIENTIFIC MISCELLANEA.

ON THE SOLUBILITY OF BONES IN WATER.

BY PROFESSOR WÖHLER.

WHEN bone-dust, such as is commonly employed as manure, is left for some time in contact with water, and the latter is filtered away, it is found to contain appreciable quantities of the phosphates of lime and magnesia. The same result is obtained when the water is freed from carbonic acid by long boiling. By filtering water for months through the same mass of bone-dust, it was found constantly to contain these earthy phosphates, and their quantity even appeared to increase in proportion as the organic matter of the bones became putrid in consequence of its long contact with water and air, and the water flowing off became turbid and offensive. This fact seems to have some practical value in agriculture, as it shows that without any artificial preparation the earthy phosphates may be extracted from the bones and introduced into the soil in a state of solution, perhaps exactly in the quantity necessary for their appointed functions, and that in the employment of bone-dust as manure all the preparation necessary is perhaps to lay it in heaps during the summer, and keep it constantly moist.—*Liebig's Annalen*, April, 1856, p. 143.

PATENTS SEALED TO APRIL 24, 1857.

March 27, 1857.

2264. JOHN BOYD, of Ashbocking, Suffolk, for letter-press printing machines.—Dated September 27, 1856.

2266. WILLIAM SMITH, of Skinner-street, Snow-hill, London, and NATHANIEL FORTESCUE TAYLOR, of Stratford, for apparatus for measuring gas and other fluids, and in regulating the flow of the same.—Dated September 27, 1856.

2270. JOHN ROTHWELL, of Bolton, Lancaster, for a certain composition and preparation to promote the ignition and combustion of coke, coal, and other combustible substances, in stoves, furnaces and grates.—Dated September 27, 1856.

2274. CHARLES JOHN CARR, of Belper, Derby, for operating hammers and stamps.—Dated September 29, 1856.

2278. DAVID THOM and GEORGE ALDCROFT PHILLIPS, of Man-

chester, for apparatus used in the manufacture of soap.—Dated September 29, 1856.

2280. John Lord, of Rochdale, for certain improvements in the process of separating or recovering animal wool or silk from cotton and wollen, or from cotton and silk or other mixed fabrics, whereby the animal wool or silk is rendered capable of being again employed, which said improvements are also applicable to wool in its manufactured state.—Dated September 29, 1856.

2283. Charles William Ramie, of Pimlico, for constructing the permanent ways of railways.—Dated September 29, 1856.

2289. Duncan Bruce, of Paspebiac, Canada, for a concentrated animal manure.—Dated September 30, 1856.

2296. Henry Naylor, of Bacup, and James Crabtree, of Rochdale, for improvements in and applicable to machines commonly known as "warping mills."—Dated October 1, 1856.

2300. Charles Durand Gardissal, of Bedford-street, Strand, London, and of 29, Boulevart St. Martin, Paris, for stoves and apparatus for heating or warming greenhouses, which may also be used for other warming or heating purposes.—Dated October 1, 1856.—(A communication.)

2344. William Wilkinson, of Nottingham, for casters in the legs of tables, chairs, pianofortes, and other articles of furniture, and in apparatus for perforating castor wheels, which is also applicable to the perforating of glass articles generally.—Dated October 7, 1856.

2380. William Rennie, of Belfast, Ireland, for condensing apparatus of steam engines.—Dated October 10, 1856.

2442. Robert Hanham Collyer, M.D., of Park-road, Regent's Park, London, for manufacturing paper.—Dated October 18, 1856.

2456. Joseph Lacassagne and Rodolph Thiers, of Lyons, France, for an electric lamp.—Dated October 20, 1856.

2474. George Thomson, of Westbourne-green, Harrow-road, Middlesex, for machinery for cutting or rending wood for laths and other uses.—Dated October 21, 1856.

2560. Francis Cook Matthews, of Great Driffield, York, for preparing manure.—Dated October 31, 1856.

78. Robert Smith, of Longridge, near Preston, for the manufacture of corded skirtings and corded petticoats.—Dated January 9, 1857.

98. George Fergusson Wilson, of Belmont, Vauxhall, for treating Burmese and such like petroleum and their products.—Dated January 12, 1857.

112. John Barsham, of Albert-road, Kingston-upon-Thames, for the manufacture of mats or fabrics used for packing.—Dated January 13, 1857.

164. Frederick Crace Calvert, of Manchester, for the use or application of certain substances in stiffening, sizeing, or otherwise preparing textile fabrics and paper.—Dated January 20, 1857.

210. George Fergusson Wilson, of Belmont, Vauxhall, for the manufacture of night lights.—Dated January 23, 1857.

212. George Fergusson Wilson, of Belmont, Vauxhall, for the manufacture of candles.—Dated January 23, 1857.

248. Thomas Cooke, of New-street, Portland-town, for ventilators for omnibuses, and in apparatus for actuating the same.—Dated January 28, 1857.

276. Alexander Wright, of Newcastle, for an improved manufacture of malt.—Dated January 30, 1857.

304. Matthew Andrew Muir and James McIlwham, of Glasgow, for moulding or shaping metals.—Dated February 2, 1857.

March 31, 1857.

2307. Joseph Renshaw, of Salford, for machinery or apparatus for cutting or producing the pile of plain or figured velvets or other pile-cut goods or fabrics.—Dated October 2, 1856.

2308. Victor Renault, of Bordeaux, France, for regulating and directing the steam escaping from the cylinders of locomotive engines.—Dated October 2, 1856.

2309. Daniel Desmond, of Upper Thames-street, London, for vessels and apparatus for storing, improving, and discharging liquids.—Dated October 2, 1856.

2311. Robert Edmeston, of Bradford, for looms for weaving.—Dated October 2, 1856.

2312. Charles Goodyear, of Leicester-square, for securing the openings of air-tight and other bags and packages.—Dated October 2, 1856.—(A communication.)

2313. Michael Thomas Crofton, of Leeds, for an apparatus for indicating and registering the number of persons entering a public vehicle or carriage.—Dated October 2, 1856.

2335. Andrew Dunlop, of Glasgow, for dressing or sifting flour or meal.—Dated October 6, 1856.

2349. William Marriott and David Sugden, of Huddersfield, for purifying coal gas.—Dated October 7, 1856.

2369. Joseph Bennett Howell, of Sheffield, for the manufacture of cast-steel.—Dated October 9, 1856.

2405. Thomas Allen, of Clifton, for the manufacture of iron and other metallic bedsteads.—Dated October 14, 1856.

2425. Peter Armand le Comte de Fontainemoreau, of Paris, and South-street, Finsbury, London, for the construction of turbines.—Dated October 17, 1856.—(A communication.)

2426. Peter Armand le Comte de Fontainemoreau, of Paris, and of South-street, Finsbury, London, for a process for purifying brandies and other alcoholic products.—Dated October 17, 1856.—(A communication.)

2427. William Dray, of Swan-lane, London, for apparatus to be employed in the stacking or storing of corn and other agricultural and horticultural produce.—Dated October 17, 1856.

2437. Samuel Cunliffe Lister and William Tongue, of Bradford, for spinning.—Dated October 17, 1856.

2438. James Robert France, of Clarence-street, Islington, for electric telegraph apparatus.—Dated October 17, 1856.

2440. William Palmer, of Sutton-street, Clerkenwell, for roof candle lamps for railway and other carriages.—Dated October 17, 1856.

2487. John Christian Bremer, of Fenchurch-street, London, for propellers—Dated October 23, 1856.

2495. Edwin Allan Athawes, of Blackfriars-road, for the construction of forks for forking land.—Dated October 23, 1856.

2504. Louis Auguste Mangin, of Paris, and of South-street, Finsbury, London, for a self-acting door-spring.—Dated October 24, 1856.

2523. MICHEL DOGNIN, of Lyons, for machinery for making lace or net.—Dated October 27, 1856.

2526. ADOLPHE ERNEST RAGON, of Bernard-street, Russell-square, for apparatus for indicating and recording the speed of ships.—Dated October 28, 1856.—(A communication.)

2579. JOHN WHITE, of Glasgow, for preparing spinning cotton and other fibrous substances.—Dated November 3, 1856.

2581. EBENEZER ERSKINE SCOTT, of Dundee, for stereoscopes.—Dated November 3, 1856.

2635. JEAN BAPTISTE EDOUARD VICTOR ALAUX, of Paris, for a lubricating composition.—Dated November 8, 1856.

2650. WILLIAM CLARK, of Chancery-lane, for the manufacture of barytes, and strontian and their salts, and in their application to various purposes.—Dated November 11, 1856.

2799. JOHN MUSGRAVE, of Bolton-le-Moors, for the construction of cloth beams for beetles.—Dated November 26, 1856.

2831. JOSEPH LATIMER CLARK, of Adelaide-road, Haverstock-hill, Hampstead, for electric telegraphs.—Dated November 29, 1856.—(Partly a communication.)

2893. WILLIAM HOOPER and JOSEPH FRY, of Mitcham, and GEORGE NASMYTH, of Bucklersbury, London, for springs for railway carriages and for other purposes.—Dated December 6, 1856.

3074. WILLIAM CLARK, of Chancery-lane, for air and water proof coatings and in their application.—Dated December 26, 1856.—(A communication.)

31. ALEXANDER ANGUS CROLL, of Harold's-wood-lodge, near Romford, for the manufacture of coal gas.—Dated January 3, 1857.

April 3, 1857.

2316. JOHN HALL, of Mount Pleasant, Walmersley, near Bury, for improvements in looms.—Dated October 3, 1856.

2323. JAMES ALLEN, of Canterbury, for improvements in coats.—Dated October 3, 1856.

2340. OGLETHORPE WAKELIN BARRATT, of Birmingham, for dyeing or staining and ornamenting of articles of pearl, bone, and vegetable ivory.—Dated October 7, 1856.

2342. SMITH BOTTOMLEY, of Bradford, and JAMES WILLIAM CROSSLEY, of Brighouse, for the manufacture of pile or nap fabrics.—Dated October 7, 1856.

2346. JOSEPH BUNNETT, of Deptford, for the manufacture of metal sash-bars, columns, and mouldings for building and decorative purposes; and for a method of protecting the same or other articles from oxidation.—Dated October 7, 1856.

2351. JAMES CHIOSSO, of Camden-town, for an apparatus for damping and affixing adhesive stamps and labels.—Dated October 8, 1856.

2357. THOMAS DUGDALE, of Blackburn, for an improved lubricator.—Dated October 8, 1856.

2436. JOHN SMITH, of Kirtley, Suffolk, for heating the feed-water of steam boilers for marine and land purposes.—Dated October 17, 1856.

2445. JOSEPH GEORGE, of Paris, and of South-street, Finsbury, London, for an improved crane.—Dated October 18, 1856.

2464. CHARLES BRIQUELER, of Dunkerque, for the purification, clarification, and discoloration of the cotton seed oil.—Dated October 21, 1856.

2492. JOHN WALLEY, of Derby, for means of preventing explosions of steam boilers.—Dated October 23, 1856.

2764. SAMUEL RUSSELL, of Gravesend, for the construction of scissors and shears.—Dated November 21, 1856.

64. JULIUS GOODMAN, ABRAHAM MYERS, and LOUIS GOODMAN, of King David-lane, Shadwell, for the manufacture of caps or coverings for the head.—Dated January 8, 1857.

71. THOMAS BALL and JOHN WILKINS, of Nottingham, for manufacturing looped fabrics suitable for the making of gloves and other articles.—Dated January 8, 1857.

114. Sir JAMES MURRAY, Knt. and M.D., of Dublin, for abating the smells and increasing the fertilizing usefulness of liquid manures, sewage, gas, or other liquors, and for means of raising or propelling such mixtures, and other solids or fluids, to convenient heights or distances.—Dated January 14, 1857.

148. ROBERT REEVES and JOHN REEVES, of Bratton, Westbury, Wilts, for machinery for delivering manure for agricultural purposes. —Dated January 17, 1857.

157. EDWIN CLARK, of Great George-street, Westminster, for floating docks.—Dated January 19, 1857.

159. EDWIN CLARK, of Great George-street, Westminster, for machinery or apparatus for raising ships out of the water for the purposes of examination and repair.—Dated January 19, 1857.

175. HENRY CHAMBERLIN, of Narborough, Norfolk, for implements or apparatus for ploughing, tilling, or cultivating land. — Dated January 21, 1857.

193. JOHN RUBERY, of Birmingham, for runners, top-notches, and other parts of umbrellas and parasols.—Dated January 22, 1857.

194. GUSTAVE PEREZ DI TERMINI, of Friday-street, London, for the construction of artificial hands.—Dated January 22, 1857.

221. HENRY BESSEMER, of Queen-street-place, New Cannon-street, London, for the manufacture of iron and steel.—Dated January 24, 1857.

259. HENRY CHAMBERLIN, of Narborough, Norfolk, for paving or covering the surfaces of roads, streets, or ways.—Dated January 28, 1857.

353. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, London, and of Buchanan-street, Glasgow, for casting metals.—Dated February 7, 1857.—(A communication.)

364. WILLIAM WILKENS, of South-street, Finsbury, London, for an improved cannon, which he calls a revolving battery.—Dated February 7, 1857.—(A communication.)

April 7, 1857.

2354. WILLIAM BRADFORD, of Manchester, for the arrangement of gas-burners for lighting and ventilating.—Dated October 8, 1856.

2356. DANIEL FOXWELL, of Manchester, for a mode or method of consuming smoke and economizing fuel thereby.—Dated October 8, 1856.

2364. THOMAS KING, of Spitalfields, for a continuous compressing machine.—Dated October 9, 1856.

2370. JOHN SHAW and EDWIN SHAW, of Glossop, Derby, for improvements in pianofortes, organs, harmoniums, and other similar keyed musical instruments.—Dated October 9, 1856.

2372. JAMES SAUL HENDY, of Essex-street, Strand, for fire stoves or grates used for domestic purposes.—Dated October 9, 1856.

2375. Christopher Richard Norris Palmer, of Southampton, for a signalizing apparatus for carriages, and improved telegraph or signal apparatus applicable to other purposes.—Dated October 10, 1856.

2379. John McInnes, of Liverpool, for an improved surface mineral coating for protecting iron and other substances, and an improved vehicle or varnish by which it is applied, and which varnish may be used with or without the addition of other substances.—Dated October 10, 1856.

2392. George Elliot, of Newcastle-upon-Tyne, for the production of oxides of manganese.—Dated October 13, 1856.

2394. William and Jacob Todd, of Heywood, for power-looms for weaving.—Dated October 13, 1856.

2398. John Roscow, of Radcliff, for machinery or apparatus for cutting or rasping dye woods.—Dated October 13, 1856.

2432. George Morton, of Keighley, for escapements for chronometers and other time-keepers.—Dated October 17, 1856.

2451. Sir Francis Charles Knowles, of Lovell Hill, Berks, for the manufacture of iron and steel, and in the preparation of fuel used therein.—Dated October 20, 1856.

1811. Richard Archibald Brooman, of Fleet-street, for the manufacture of cranked axles and shafts.—Dated November 6, 1856. —(A communication.)

2751. Richard Archibald Brooman, of Fleet-street, for a method of, and certain varnishes or compositions for, rendering wood and other substances uninflammable and fire-proof, applicable also to the indurating of calcareous earths and stone, and to the rendering of paper and fabrics damp-proof, together with apparatuses for manufacturing such compositions.—Dated November 20, 1856.—(A communication.)

3080. Thomas Wilks Lord, of Leeds, for an improved mode of drying flax, tow, hemp, silk, cotton, and other yarn, in the process of dressing, warping, sizeing, beaming, and preparing yarn for weaving. —Dated December 27, 1856.

232. Edward Highton, of Gloucester-road, Regent's Park, for electric telegraphs.—Dated January 26, 1857.

April 14, 1857.

2400. Richard Sumner, of Droylesden, Lancaster, for power-looms for weaving.—Dated October 14, 1856.

2401. John Knowles, of St. Helen's, Lancaster, for an apparatus for the prevention of accidents in winding from mines, which apparatus is also applicable for other similar purposes.—Dated October 14, 1856.

2406. George Guillaume, of Southampton, for obtaining motive power by means of water or other fluid.—Dated October 15, 1856.

2407. Joseph Henry George Wells, of Essex-street, Strand, for windlasses.—Dated October 15, 1856.—(A communication.)

2408. Edward Hallen, of Cornwall-road, Lambeth, for the construction of chairs, sofas, bedsteads, and similar articles of furniture to sit or recline upon.—Dated October 15, 1856.

2409. James Burrows, of Wigan, for an arrangement of apparatus employed in winding coals or other minerals from mines, which said improvement is also applicable for other similar purposes.—Dated October 15, 1856.

2410. Bennett Johns Heywood, of Hawley-road, Camden-town,

for valves for inflating air-tight bags, cushions, and other similar articles, and for drawing off liquids.—Dated October 15, 1856.

2415. ALFRED TOOTH, of Mincing-lane, London, for a process for bleaching malt, whereby the colour is rendered more suitable for the brewing of pale or bright malt liquors.—Dated October 16, 1856.

2418. CHARLES NAPOLEON WILCOX, of Islington, for the preparation and application of certain vegetable matters to be used in toilette soaps, pomades, and other like perfumery.—Dated October 17, 1856.

2458. JOSIAH GEORGE JENNINGS, of Holland-street, Blackfriars, for the construction of wall caps, sleeper blocks for the basements of buildings, and bricks to be used as substitutes for wood bricks in buildings.—Dated October 20, 1856.

2460. ANTHONY LORIMIER, of Bedford-square East, Commercial-road, for re-working vulcanized india-rubber.—Dated October 20, 1856.

2466. JOHN COWDERY MARTIN, of Charlewood-road, Putney, for an improvement in glazing paper.—Dated October 21, 1856.

2508. WILLIAM BENSON, of Four Stones, near Hexham, Northumberland, for apparatus for drying grain, seeds, and other substances.—Dated October 25, 1856.

2519. THOMAS ALLAN, of Adelphi-terrace, Westminster, for the permanent way of railways.—Dated October 27, 1856.

2527. WILLIAM SEPTIMUS LOSH, of Wreay Syke, Cumberland, for the preparation of size, which may also be used as a waterproof varnish or coating.—Dated October 28, 1856.

2528. JEAN LOUIS MARIE, of Paris, for raising, propelling, and forcing water and other fluids, and in obtaining motive power.—Dated October 28, 1856.

2533. ADOLPHE AUBRIL, of Newman-street, Oxford-street, for the application of a certain root to the manufacture of starch, paper, and cardboard.—Dated October 28, 1856.

2541. THOMAS SMITH HENZELL, of South Shields, for the construction of ships or vessels.—Dated October 29, 1856.

2546. FREDERIC WHITAKER, of Canonbury-road, Lower-road, Islington, for apparatus for supplying water to steam boilers.—Dated October 29, 1856.

2569. JAMES COUL SINCLAIR, of Elgin, Moray, for treating, preparing, and drying agricultural produce.—Dated November 1, 1856.

2587. WILLIAM GRAY and JOHN TATE, of Newcastle-on-Tyne, for apparatus for washing.—Dated November 4, 1856.

2844. JOHN CARTER RAMSDEN, of Bradford, for apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.—Dated December 1, 1856.

2916. THOMAS PEAKE, of Abbey-street Mill, Derby, for the manufacture of chenille and other piled fabrics.—Dated December 9, 1856.

3002. CHARLES FAY, of Manchester, for railway carriages and breaks.—Dated December 18, 1856.

3020. THEODORE DETHIER, of Pimlico, for an improved knife cleaner.—Dated December 22, 1856.

271. JAMES THOM, of Lambeth, for the construction and mode of fixing artificial teeth.—Dated January 30, 1857.

328. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, and of Glasgow, for the treatment of flax and similar textile materials.—Dated February 4, 1857.—(A communication.)

416. William Edward Newton, of Chancery-lane, for machinery for turning articles of irregular forms in the direction of their length.—Dated February 12, 1857.—(A communication.)

420. Thomas Wingate, of Glasgow, for screw propellers, and in adjusting the same.—Dated February 12, 1857.

421. Charles Wye Williams, of Liverpool, for increasing the draught and promoting the combustion of the fuel in furnaces.—Dated February 13, 1857.

435. James Cocker, of Liverpool, for apparatus for the manufacture of wire, part of which improvements is applicable to the annealing of other metallic articles.—Dated February 13, 1857.

April 17, 1857.

2419. Edward Tombs, of Islington, for screw propelling.—Dated October 17, 1856.

2421. Ferdinando Foggi, of Southampton-place, New-road, for the manufacture of engines driven by steam or other vapour.—Dated October 17, 1856.

2449. Charles Humfrey, of the Terrace, Camberwell, for the manufacture of grease for lubricating railway axles and other machinery.—Dated October 18, 1856.

2450. Joseph Harrison, of Blackburn, for machinery for warping yarns, part of which improvements are applicable to creels used for other purposes.—Dated October 20, 1856.

2454. James Young, of South Shields, for an improved ventilator.—Dated October 20, 1856.

2457. John Thomas Forster, of Wandsworth-road, for symbols used in signalling.—Dated October 20, 1856.

2468. Peter Armand le Comte de Fontainemoreau, of Paris, and of South-street, Finsbury, London, for an improved knitting loom.—Dated October 21, 1856.—(A communication.)

2489. Nehemiah Brough, of Birmingham, for dress fastenings.—Dated October 23, 1856.

2498. George White, of Bromley, for the treatment of grain in order to produce starch and spirit therefrom.—Dated October 24, 1856.

2551. Constantine John Baptist Torassa, of Genoa, for an apparatus for calculating the speed of vessels at sea, as well as obtaining the extent of their destination caused by the side winds.—Dated October 30, 1856.

2622. William Spence, of Chancery-lane, for apparatus used in the manufacture of silk and other fibrous materials.—Dated November 7, 1856.—(A communication.)

2700. Nicholas Pierre Joseph Leseure, of Paris, and of South-street, Finsbury, London, for an embroidering machine.—Dated November 15, 1856.

2948. Louis Joseph Frederic Margueritte, of Paris, for purifying rock and sea salt.—Dated December 11, 1856.

334. Henry Smith, of Stamford, Lincoln, for hay-making machinery.—Dated February 5, 1857.

April 21, 1857.

2470. William Smith, of Salisbury-street, Adelphi, for water

level and pressure indicators and lubricators.—Dated October 21, 1856.—(A communication.)

2180. Godfrey Ermen, of Manchester, for machinery or apparatus for the finishing and treatment of yarns or threads.—Dated October 22, 1856.

2485. John Francis Porter, of Park-street, Westminster, for the manufacture of bricks and other articles of clay and brick earth, or of the like materials.—Dated October 23, 1856.

2488. John Macdonald, of Henry-street, Upper Kennington-lane, Vauxhall, for regulating the supply of oil or other liquids, applicable to lamps, gas meters, and other useful purposes.—Dated October 23, 1856.

2490. Albert Demerit Bishop, of Woolwich, for apparatus for facilitating the finding and raising of vessels and submerged articles. —Dated October 23, 1856.

2491. Theophilus Horrex, of South-square, Gray's-inn, for fastening buttons and other similar articles on to garments and other things.—Dated October 23, 1856.

2497. Isaac Bailey, of Bradford, for machinery for spinning wool, cotton, alpaca, mohair, and other fibrous materials.—Dated October 24, 1856.

2530. Joseph Armstrong, of Normanton, York, for the permanent way of railways.—Dated October 28, 1856.

2548. David H. Whittemore, of Worcester, Massachusetts, U. S. A., for a machine for paring, slicing, and coring fruit or vegetables.—Dated October 29, 1856.

2570. Thomas Ainsley Cook, of Newcastle-on-Tyne, for treating manganese ores.—Dated November 1, 1856.

2574. William Joseph Curtis, of Sebbon-street, Islington, for lighting and ventilating railway carriages.—Dated November 1, 1856.

2576. Samuel Tearne, and George William Richmond, of Birmingham, for producing ornamental designs on the surfaces of fancy and other goods made of papier mache, wood, glass, china, earthenware, tin, iron, or other such like materials, the surfaces of which, when made up, are usually finished by staining, varnishing, painting or japanning.—Dated November 3, 1856.

2577. James Nasmyth and Robert Wilson, of Patricroft, near Manchester, for hydraulic pumps and presses for packing cotton and other articles of the like nature.—Dated November 3, 1856.

2580. Eugene Napoleon Cadet, of Paris, for the construction of cocks and taps.—Dated November 3, 1856.

2596. Charles Titterton, of Roehampton, Surrey, for the manufacture of zinc and zinc white.—Dated November 5, 1856.

2598. William Edward Newton, of Chancery-lane, for steam engines.—Dated November 5, 1856.—(A communication.)

2600. Herbert Keeling, of Rotherhithe, for rivetting fish joints and other parts of the permanent way of railways.—Dated November 5, 1856.

2609. George Collier, of Halifax, for drying, stretching, and polishing or finishing yarns.—Dated November 5, 1856.

2625. Louis Joseph Victor Vuitton, of Paris, for an apparatus for consuming smoke.—Dated November 7, 1856.

2633. William Morphet, of Leeds, for producing the velvet pile and Witney finish in cloths, and in machinery or apparatus for the same.—Dated November 8, 1856.

2638. Richard Archibald Brooman, of Fleet-street, for machinery for cutting and dressing stone, marble, and similar materials.—Dated November 8, 1856.—(A communication.)

2657. Julian Bernard, of Piccadilly, for the manufacture or production of boots and shoes, or coverings for the feet, and in the machinery or apparatus employed in such manufacture.—Dated November 11, 1856.

2674. Charles Wastell Dixey, of New Bond-street, for double opera glasses, and other glasses of a similar nature.—Dated November 13, 1856.

2680. John Kinniburgh, of Renfrew, for moulding or shaping metals.—Dated November 13, 1856.

2734. William Edward Newton, of Chancery-lane, for centrifugal pumps.—Dated November 19, 1856.—(A communication.)

241. David Yoolow Stewart, of Glasgow, for moulding or manufacturing cast-iron pipes.—Dated January 27, 1857.

341. James Gilroy, of Auldhousefield, near Pollockshaws, Renfrew, for applying starch or other semi-fluid matter by machinery to woven fabrics.—Dated February 6, 1857.

454. John Henry Johnson, of Lincoln's-inn-fields, and of Buchanan-street, Glasgow, for machinery or apparatus for the manufacture of pasteboard.—Dated February 16, 1857.—(A communication.)

473. Hector Christie, of Salford, for finishing and polishing threads and yarns.—Dated February 19, 1857.

488. Thomas Clayton, of Manchester, for machinery or apparatus for ornamenting and embossing wood, leather, paper, and other similar materials.—Dated February 19, 1857.

510. John Henry Johnson, of Lincoln's-inn-fields, and of Buchanan-street, Glasgow, for spinning machines.—Dated February 21, 1857.—(A communication.)

545. Alexander Mitchell, of Peterhead, Aberdeen, for harpoon guns.—Dated February 24, 1857.

547. William Wood, of Monkhill House, near Pontefract, York, for machinery or apparatus used in the manufacture of carpets and other pile fabrics.—Dated February 25, 1857.

555. John Henry Johnson, of Lincoln's-inn-fields, and of Buchanan-street, Glasgow, for apparatus or instruments for measuring distances and elevations.—Dated February 25, 1857.—(A communication.)

April 24, 1857.

2503. Howard Ashton Holden, of Birmingham, for furniture for railway and other carriages, and which said improvements are also applicable as a means of finishing or ornamenting the iron parts of harness and other articles made of iron, to which such mode of finish or ornamenting has not heretofore been applied.—Dated October 24, 1856.

2511. George Henry Bachhoffner, of Upper Montagu-street, for glass shades for gas and other artificial lights.—Dated October 25, 1856.

2513. Henry Forfar Osman, of Essex-street, Strand, for a contrivance for distending the skirts of ladies' dresses, and preserving the required form and shape thereof.—Dated October 25, 1856.

2529. William Armand Gilbee, of South-street, Finsbury, Lon-

don, and of Paris, for the construction of smoke-consuming furnaces. —Dated October 28, 1856.—(A communication.)

2543. WILLIAM KOPKE, of Hackney, for an improved clasp board to hold documents for reference.—Dated October 29, 1856.

2599. WILLIAM CLISSOLD, of Dudbridge, Gloucester, for apparatus for regulating the supply of water to water-wheels.—Dated November 5, 1856.

2641. ANDREW BARLOW, of Shirley, Hants, for mashing apparatuses.—Dated November 10, 1856.

2642. FRANCOIS JULES MANCEAUX and EUGENE NAPOLEON VIEILLARD, of Paris, for breech-loading fire-arms and ordnance.—Dated November 10, 1856.

2668. RICHARD ARCHIBALD BROOMAN, of Fleet-street, for the preparation of fibres for spinning and in machinery employed therein.—Dated November 12, 1856.—(A communication.)

2677. SAMUEL NEWINGTON, of Ticehurst, Sussex, for dibbling apparatus.—Dated November 13, 1856.

2706. JOHN BILLING, of Abingdon-street, Westminster, for chimneys.—Dated November 15, 1856.

2723. RICHARD BUTTERWORTH, of Chelsea, for the means of securing the ends of rails for railways.—Dated November 18, 1856.

2740. LOUIS ADOLPHE DE MILLY, of Paris, for the manufacture of fatty acids.—Dated November 19, 1856.

2793. HENRY BOUGLEUX, of Leghorn, for the construction of steam boilers.—Dated November 25, 1856.

2942. FREDERICK WILLIAM ANDERTON and JOSEPH BEANLAND, of Bradford, for apparatus or means in connexion with furnaces to facilitate the consumption of smoke.—Dated December 11, 1856.

50. HENRY BOUGLEUX, of Leghorn, for steam boilers.—Dated January 6, 1857.

88. JOHN CHANTER, of Bow-road, Middlesex, and JOHN WAKEFIELD, of Suchicore, Dublin, for the fire boxes or furnaces of locomotive engine boilers.—Dated January 10, 1857.

133. THOMAS JACKSON MILNES TOWNSEND, of Searby, near Brigg, Lincoln, for drain pipes and in machinery for producing the same.—Dated January 16, 1857.

237. JOHN DANGERFIELD, of West Bromwich, Stafford, for the manufacture of chains.—Dated January 27, 1857.

370. LEON TALABOT, of Paris, for the manufacture of iron and steel.—Dated February 9, 1857.

388. THOMAS FIELDING JOHNSON and JOHN WILLIAMS, of Leicester, for screw gill machinery for preparing wool and other fibrous materials. —Dated February 10, 1857.

425. FREDERIC HENRY SYKES, of Cork-street, Piccadilly, for apparatus for supplying or feeding boilers with water, applicable to raising and forcing liquids for other purposes.—Dated February 13, 1857.

451. WILLIAM EDWARD WILEY, of Birmingham, for the manufacture of metal pens and penholders.—Dated February 16, 1857.

468. ROBERT BARLOW COOLEY, of Nottingham, for the manufacture of knitted fabrics.—Dated February 17, 1857.

470. JOHN NAYLOR, of Winterton, near Brigg, Lincoln, for horseshoes.—Dated February 17, 1857.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(To the 22d April, 1857, inclusive.)

699. James Robertson, of Glasgow, for lifting or transporting heavy bodies.—Dated March 25, 1854.

756. George Fergusson Wilson, of Belmont, Vauxhall, and William Walls, of Glasgow, for dyeing Turkey red.—Dated April 1, 1854.

694. Samuel Humphreys, of Green-street, Leicester-square, for apparatus for the heating or distilling of fatty oil and resinous matters.—Dated March 24, 1854.—(A communication.)

709. James Alexander Manning, of the Inner Temple, London, for the treatment of sewerage.—Dated March 27, 1854.

793. Simon O'Regan, of Liverpool, for engine boiler furnaces and other furnaces.—Dated April 6, 1854.

733. Philip John Bassavant and John Cure, of Bradford, for machinery or apparatus for combing wool and other fibrous substances.—Dated March 30, 1854.

739. Archibald Douglas Brown, of Glasgow, for beds, couches, and other articles of furniture.—Dated March 31, 1854.

752. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for printing fabrics and in the machinery or apparatus employed therein.—Dated April 1, 1854.—(A communication.)

819. William Rigby, of Manchester, for machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other surfaces.—Dated April 7, 1854.

761. Richard Edward Hodges, of Southampton-row, Russell-square, for connecting wheels, drums, cylinders, and pulleys, with their naves, axles, and the parts thereof one to the other.—Dated April 3, 1854.

785. Stephen Randoll Smith, of Bristol, for vessels and apparatus used for raising sunken vessels and other bodies in the water, and for lowering materials for structural purposes in water.—Dated April 5, 1854.

742. William Edward Newton, of Chancery-lane, for an improved manufacture of carpet.—Dated March 31, 1854.—(A communication.)

743. Alfred Vincent Newton, of Chancery-lane, for manufacturing carpets.—Dated March 31, 1854.—(A communication.)

827. John Platt, of Oldham, Lancaster, for machinery for preparing cotton.—Dated April 8, 1854.

757. Thomas Scott, of Brighton, for machinery for propelling.—Dated April 3, 1854.

771. Bernhard Samuelson, of Banbury, Oxford, for machinery for cutting turnips and other vegetable substances.—Dated April 4, 1854.

786. George Francis Wilson and James Monroe Whiting, of Rhode Island, U. S. A., for the manufacture of wood screws.—Dated April 5, 1854.

758. James Forsyth, of Caldbeck, Cumberland, for machinery for preparing and spinning wool and other fibrous substances.—Dated April 3, 1854.

762. William Gossage, of Widnes, Lancaster, for the manufacture of certain kinds of soap.—Dated April 3, 1854.

781. William Edward Newton, of Chancery-lane, for printing piece goods or fabrics.—Dated April 5, 1854.—(A communication.)

868. Giuseppe Devincenzi, of Grosvenor-street, for a method or methods of producing engraved, figured, and typographic surfaces for printing and embossing from, and for ornaments; also certain machinery employed therein.—Dated April 13, 1854.

796. Emile Dupont, of Boulogne-sur-Mer, France, for the manufacture of certain cements.—Dated April 6, 1854.

766. James Higgin, of Manchester, for a mode or method of separating metals from each other when in conjunction, and in obtaining useful products therefrom.—Dated April 4, 1854.

792. Joseph Nash, of Thames-parade, Pimlico, for the manufacture and refining of sugar.—Dated April 6, 1854.

800. Julian Bernard, of Club Chambers, Regent-street, for stitching or uniting and ornamenting various materials, and in machinery or apparatus for the same purpose.—Dated April 6, 1854.

802. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for a revolving, blowing, and ventilating water extractor for drying cloth.—Dated April 6, 1854.—(A communication.)

818. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for an alkaline steam washing apparatus.—Dated April 7, 1854. —(A communication.)

782. James Howden, of Glasgow, for the manufacture of rivets, bolts, spikes, screw-blanks, and similar articles.—Dated April 5, 1854.

789. James Smith, of St. Leonard's-on-Sea, for the construction of railways.—Dated April 6, 1854.

801. James Worrall, junior, of Salford, for the method of bleaching fustians and other textile fabrics, and in the machinery or apparatus connected therewith.—Dated April 6, 1854.

814. John Rankin, of Liverpool, for machinery for cleaning corn and seeds.—Dated April 7, 1854.

817. John Robert Johnson, of Hammersmith, for the manufacture of type and other raised surfaces for printing.—Dated April 7, 1854.

861. Samuel Colt, of Spring-gardens, Middlesex, for machinery for cutting or shaping metals.—Dated April 12, 1854.—(Partly a communication.)

923. Aime Blavier, of Paris, for locomotive engines.—Dated April 21, 1854.

843. Zachariah Round, of Dudley, Worcester, for bricks to be used in certain parts of buildings.—Dated April 11, 1854.

845. Edward Lavender, of Princes-road, Bermondsey, for apparatus for stirring and acting on matters subjected to heat in retorts.—Dated April 11, 1854.

850. Thomas Schofield Whitworth, of Salford, for improvements in the mule for spinning and doubling cotton and other fibrous materials.—Dated April 11, 1854.

859. William Coltman, of Leicester, for knitting-frames.—Dated April 12, 1854.

871. HENRY MEYER, of Manchester, for looms for weaving—Dated April 15, 1854.

916. FREDERICK BUONAPARTE ANDERSON, of Gravesend, for spectacles and eye-glasses.—Dated April 21, 1854.

877. FREDERIC BARNETT, of Caroline-street, Bedford-square, for illuminated furniture, &c., for interior and exterior decoration.—Dated April 15, 1854.

890. JULIAN BERNARD, of Club Chambers, Regent-street, for the manufacture of boots and shoes, and in the machinery or apparatus connected therewith.—Dated April 18, 1854.

891. JULIAN BERNARD, of Club Chambers, Regent-street, for improvements in stitching, and machinery and apparatus connected therewith.—Dated April 18, 1854.

894. HENRY HUCKS GIBBS, of Bishopsgate-street, for the manufacture of nitrate of soda.—Dated April 18, 1854.—(A communication.)

897. JEAN FRANCOIS FELIX CHALLETON, of Brughat, France, and also of Castle-street, Holborn, London, for machinery for purifying and condensing peat, and also for conveying it.—Dated April 18, 1854.

924. HENRY BERNOULLI BARLOW, of Manchester, for manufacturing metal nuts, and in machinery for stamping, forging, and punching the same.—Dated April 22, 1854.—(A communication.)

892. JOHN ROWLEY, of Camberwell, for the manufacture of a material as a substitute for leather.—Dated April 18, 1854.

935. MOSES POOLE, of the Avenue-road, Regent's Park, for improvements in washing garments and fabrics.—Dated April 24, 1854.—(A communication.)

960. JOSEPH BARLING, of Maidstone, for treating the hop-bine, and rendering it applicable to the manufacture of paper and other articles.—Dated April 27, 1854.

938. JAMES COMBE, of Belfast, Ireland, for machinery for heckling flax and other fibrous substances.—Dated April 24, 1854.

964. JOHN EVANS, of Abbots Langley, Hertford, for a new manufacture of paper.—Dated April 28, 1854.

1032. CHARLES BENJAMIN NORMAND, of Havre, France, for machinery for sawing wood.—Dated May 8, 1854.

1226. MOSES POOLE, of the Avenue-road, Regent's Park, Middlesex, for cop tubes for mule and other spindles, and machinery for making such cop tubes.—Dated June 2, 1854.—(A communication.)

927. THOMAS FREEMAN FINCH, of Worcester, for the manufacture of buttons.—Dated April 22, 1854.

941. JONATHAN DAVIDSON, of Edinburgh, for improvements in breakwaters.—Dated April 24, 1854.

THE

REPERTORY

OF

PATENT INVENTIONS.

No. 6. Vol. XXIX. ENLARGED SERIES.—JUNE, 1857

Specification of the Patent granted to John Ellis, *of Heckmondwicke, in the County of York, Surgeon, for Improvements in the Manufacture of Muriate of Ammonia and Carbonate of Ammonia, and in Converting certain Ingredients employed therein into an Artificial Manure.*—Dated June 9, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention consists in manufacturing muriate of ammonia and carbonate of ammonia in the following manner: —I take ammonia, manufactured according to a former patent, dated 18th of July, 1855, No. 1,616, granted unto me, the said John Ellis, and operate upon it in the following manner:—I use a still of the ordinary kind, into the bottom of which a pipe is fixed, and passes to the outside of the brickwork or setting thereof, said pipe being furnished with a pipe for drawing off the contents of the still remaining after the process of distillation, which are allowed to run into an iron box beneath the same. The beak of the still is connected to one side of an iron box,

into which the ammonia enters, and in doing so it strikes forcibly against the opposite side of the said box, and then escapes by a pipe fixed to the top of the box into a worm connected therewith, immersed in a vessel containing cold water; by these means the force of the gas is checked, and the gas freed of a great portion of water, fluid, or other impurities with which it may be impregnated. To the bottom of the aforesaid box is affixed a tap and pipe, for the purpose of allowing the escape of the said impurities. The bottom of the cistern has a cock connected thereto, for the purpose of allowing the gas to escape when not required for the purposes hereinafter mentioned. When it is not required to use this cock, I connect in its place a pipe, the opposite end of which has three branch pipes affixed thereto, which extend upwards into a receiver containing phosphate of lime, animal charcoal, carbonate of lime, animal refuse, and such like ingredients or substances, which are well mixed together, and then watered with a weak solution of sulphuric acid. The ammoniacal gas is then forced into the vacant space below the floor. The floor is made of bricks, perforated similar to those used in drying malt, &c.; through these openings the gas escapes, and is absorbed by the lime, &c., and thus becomes an artificial manure or fertilizing agent. There is a valve at top of the above vessel or manure house, for the escape of atmospheric air and surplus ammoniacal gas. The construction of the apparatus which I employ in the manufacture of muriate of ammonia and carbonate of ammonia is similar to that lastly above described as far as the worm; from thence a pipe furnished with a cock proceeds to a condensing vessel or receiver immersed in another vessel containing cold water. There is another pipe fixed to the top of the aforesaid condenser, communicating by a cock with a boiler, into which I introduce muriate of soda or common salt, and sulphuric acid, thereby forming sulphate of soda, and setting free muriatic acid gas by means of a slow fire. This gas entering the aforesaid condenser, and mixing with the ammonia therein, muriate of ammonia is thus formed, and by using carbonate of lime in lieu of the muriate of soda, above mentioned, I thereby form bicarbonate of ammonia. There is a valve at top of the condenser for the escape of common air or surplus gas.

I would observe that the novelty of this part of my said

invention consists in the admixture of two gases in the condenser, either alone or through the medium of water, and then evaporating the water to obtain the crystals of muriate or carbonate of ammonia produced by such admixture.

In order to explain my said invention as completely as possible, I now proceed to describe the best means I am acquainted with for carrying the same into practical effect, reference being had to the illustrative drawing hereunto annexed, and to the numeral figures and letters of reference marked thereon respectively, as follows:—

Description of the Drawing.

Fig. 1, is a front elevation of the apparatus which I employ during the first part of the manufacture of muriate of ammonia and carbonate of ammonia according to my said improvements. This apparatus is similar in all respects to that previously described in the specification of a former patent granted unto me, the said John Ellis, on the 18th day of July, 1855, No. 1,616, intituled "Certain improvements in the process of manufacturing ammonia, charcoal, animal and vegetable naphtha" (which naphtha is employed in my present improved process for the cleaning of the waste wool used in the retorts).

Fig. 2, is a front elevation of another apparatus which I employ in the second part of my present improved process of manufacture.

Fig. 3, is a front elevation of another apparatus which I employ for conducting the third and last part of my said process.

I now proceed to describe the construction of the several above-mentioned apparatus as follows. As regards the apparatus exhibited at fig. 1, A, A, is brickwork, in which are set retorts, B, B, B, in the usual way; C, is the fire-place; D, D, D, iron piping leading from the several retorts to the condenser, E; G, G, G, ends of the pipes, D, immersed in about ten inches of water in the said condenser; H, cistern filled with water, in which the condenser, E, is placed and securely held in position in any convenient manner; I, cock for drawing off the condensed gas into a receiver, L; M, safety tube for relieving the pressure upon the condenser or retorts; N, a cock for supplying water to the condenser, E, E, without the necessity of removing the top of the condenser.

The mode of operating with the above apparatus having already been fully described in the specification of my said former patent, No. 1,616, I now proceed to describe the mode of operating with the said apparatus for the purposes of this present invention, observing, that the principal feature of novelty consists in separating that portion of the wool refuse, referred to in the specification of my said former patent, and which is commonly known and distinguished as "tar lumps," from the other portions of the refuse, as I have since found that all naphthas are good solvents for tar, but that in preference to others I use the naphtha produced from the refuse, which makes the muriate of ammonia, and which is a good solvent for the tar, thus leaving this portion of the woollen refuse (or tar lumps) fit for working over again, laying claim to the discovery of cleaning that portion of woollen refuse known as tar lumps by the application of all or any kinds of naphtha. The apparatus which I employ for the above purpose of separation consists simply of a wooden box, of any desired shape or size, lined with lead, into which I place any desired quantity of naphtha, but not less than will cover the wool to be operated upon thereby. The above box is surmounted by a lid fixed tight thereon. When the wool has been steeped in the naphtha from one to four hours, the naphtha is then allowed to escape by a tap into another similar vessel, and the process repeated as before; the wool is then removed, the naphtha pressed out by means of two rollers or hydraulic pressure, and the wool thoroughly washed in warm water with soap, and then dried, thereby enabling it to be worked over again, as before stated.

The construction of the apparatus exhibited at fig. 2, is as follows:—A, is a still set in brickwork, B; C, manhole of still; D, beak; E, tap for running off contents of still after distillation; G, an iron box, into the side of which the beak of the retort, D, enters, and into which box the ammonia enters at one side and impinges against the other side, and passes from thence into the worm, I; thus the force of the gas is checked, and at the same time freed of the greater portion of the water or other fluid with which it may have become impregnated, and which water, fluid, or other impurities, are allowed to escape by the tap, S. The worm, I, is immersed in a cistern, K, containing cold water, said cistern being furnished with a tap which can

be removed to allow the pipe, L, to be adjusted in its place to convey the ammoniacal gas to mix with or impregnate the lime, charcoal, &c., which is contained in the manure house. M, is a cistern to receive any liquid, &c., which may remain after distillation of the ammonia; N, is a pipe for conveying the ammonia by the branches, O, O, to the floor of the manure house, P. The sides and top of this vessel I form of lead, or other suitable material capable of holding the gaseous bodies, and the floor, Q, I form of perforated bricks, such as are used in drying malt, and I make such said manure house or vessel from four to five feet high, twelve feet wide, and twenty feet long. The ingredients which I employ in conjunction with the above-mentioned gaseous bodies for producing an artificial manure are animal charcoal, phosphate of lime, carbonate of lime, animal refuse, or other known substances containing similar chemical bases; these are well mixed and incorporated together in proportions suitable to the various soils on which the manure is to be used, and then watered with a weak solution of sulphuric acid. The ammoniacal gas is then forced into the space below the floor of the manure house, through the perforations whereof the gas escapes and passes into and amongst the above-mentioned ingredients, by which it is absorbed, thereby converting the same into a cheap artificial manure. R, is a valve for the escape of common air or surplus gas.

The construction of the apparatus exhibited at fig. 3, is as follows:—A, is a still set in brickwork, B; C, manhole; D, beak; E, iron box, employed for the same purpose as that marked G, at fig. 2; F, a tap for the escape of condensed water; G, worm immersed in a cistern, H, containing cold water, said worm conveying the gas to the condenser by the pipe, I, connected therewith; K, is a valve to relieve the pressure upon the condenser, or to allow the escape of superfluous gas, &c., therefrom. L, is another still or boiler set in brickwork, M; N, the beak of said still, communicating with the receiver, O. Into the boiler or still, L, I place muriate of soda and sulphuric acid, in the proportion of about six parts of soda to one part of acid, by which I form sulphate of soda; at the same time setting free muriatic acid gas; this I effect by the use of a slow fire. The muriatic acid gas, thus formed, passes from the still into the receiver by the pipe, P, where it mixes with the ammonia contained therein, thus forming muriate of ammonia. The same process to that lastly

above-mentioned is gone over to form the bicarbonate of ammonia, excepting that instead of muriate of soda I use carbonate of lime; in the first instance sulphate of soda is produced, and in the second sulphate of lime, both of which I employ to enrich the manure. The muriate of ammonia may be removed from the condenser by taking off the top thereof, which is made fast by bolts and nuts.

Having now described the nature and object of my said invention of "improvements in the manufacture of muriate of ammonia and carbonate of ammonia, and in converting certain ingredients employed therein into an artificial manure," I would remark, in conclusion, that what I claim as my invention, intended to be secured to me by the above in part recited letters patent, is,—

Firstly, the apparatus above described, and represented at figs. 1, 2, and 3, and which I employ in and for the manufacture of muriate of ammonia and carbonate of ammonia, together with the modes above particularly described of conducting such said processes, as above stated.

Secondly, in converting certain ingredients employed in such manufacture into an artificial manure by combining them with phosphate of lime, animal charcoal, carbonate of lime, animal refuse, and such like ingredients, as above stated;

Also in employing or using the naphtha produced by or under my former patent, either solely or in conjunction with any other kind of naphtha, for the purpose of cleaning all sorts of wool and refuse that may be impregnated or mixed with tar.—In witness, &c.

JOHN ELLIS.

Specification of the Patent granted to ALEXANDER EBENEZER RIDDLE, *of* 33, *Walbrook, City, and* ISAAC HOARE BOYD, *of* 3½, *Mansion-house-place, City, for Improvements in Tanning by Machinery and Chemicals.*—Dated May 8, 1856.—(A communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—By the process in ordinary use the tanning of skins and hides occupies several weeks for the smaller and thinner kinds, and several months for the larger and thicker descrip-

tions; and the tanning liquor or liquid in which they are immersed usually consists of a saturated solution of bark, varying in strength according to the stage of the process, such solution or extract of bark being contained in pits, into which the skins or hides are thrown, and is from time to time removed by pumping out, or is strengthened by adding thereto more tanning bark; and the skins are also taken out from time to time and examined, and in such cases are stacked by the side of the pit, and allowed to drain off; they are then re-immersed and the absorption of the tanning permitted again to go on until finally the skins are, after several weeks or several months, as the case may be, tanned throughout.

Now, our invention has for its object the more rapid performance of the same operation, and in an equally perfect manner, and consists of treating the hides or skins as described in the Provisional Specification of this invention.

The mode of treating the hides or skins according to our invention consists in passing them more frequently through the tanning liquor, or causing the tanning liquor and the hides or skins to move or circulate in the pit by means of a paddle-wheel-like drum erected over the pit, and which is caused to revolve or rotate by hand or other power. Over a pit, four feet six inches long and three feet wide, we place a drum with close ends, about three feet diameter and of a length sufficient to work between the sides or in the width of the pit; the float boards may be about seven inches in depth, and of the length of the drum, and by immersing the periphery of the drum, say about eight inches below the surface of the tanning liquor, we find that on communicating a slow motion, say about twenty-four evolutions per minute, the skins are kept in motion, being caused to rise from the false bottom of the pit on the one side to the top, and are then turned over and descend again to the bottom, where each skin in its turn again rises, and the entire number of the hides or skins are thus caused to circulate and thereby become more readily acted upon by the tanning principle of the liquor or liquid in which they are immersed. In square bottomed pits we place a curved false bottom of open lath work, of suitable size and form to suit the size of the pit and the diameter of the paddle-wheel-like drum erected over it. We prefer to close each pit with a close-fitting cover, which, being hinged, may be thrown back when fresh

skins have to be put in, or those in process of tanning require to be removed.

In the accompanying drawing,

Fig. 1, is a sectional elevation of a small tannery, according to this invention.

Fig. 2, is a plan of fig. 1.

Figs. 3 and 4, are enlarged views of a small tan pit, fitted with the false bottom, the drum wheel, and the close cover. The number and arrangement of the pits and gearing is shown with a view to convey a general idea of a small tannery, conducted under cover of a galvanized iron shed, and protected from the weather, and is not intended to fix, limit, or confine us to the details thereof, as any other arrangement or disposition of the pits may be made; but figs. 3 and 4 illustrate the mechanical features of our invention; A, being the pit; B, the curved false bottom; C, the cover; D, the drum, of which *a*, *a*, are the ends; *b*, *b*, are the float boards; *c*, the centre shaft or axle; *d*, the plummer blocks or bearings. The drum is constructed of wood, and may be driven by a crank handle, or by a rigger or pulley. The speed we have found suited to ordinary cases is, when the periphery of the drum revolves, at about 200 or 220 feet per minute.

Having now described our invention, and illustrated it by the accompanying drawing, we wish it to be understood that we do not claim the use of revolving drums, wherein the tanning liquor and the hides or skins are placed and caused to revolve together; nor do we claim any other form or kind of drum or wheel unless it be immersed in the tanning liquor, and for the purpose of causing a motion or circulation of the tanning liquor and skins together; neither do we claim the use of any chemical ingredient for facilitating the absorption or taking up of the tannin contained in the tanning liquor.

But what we do claim is,—

The apparatus, as described, or its mechanical equivalents for effecting a circulation of the tanning liquor or liquid and the skins, whereby the period required or necessary for thoroughly tanning hides or skins and converting them into leather is materially shortened, and the consequent economy effected thereby.—In witness, &c.

ALEXANDER EBENEZER RIDDLE.
ISAAC HOARE BOYD.

Specification of the Patent granted to OBED BLAKE, *of the Thames Plate Glass Works, Blackwall, in the County of Middlesex, Manager, for Improvements in Applying Practically the Principle of Internal Reflection within Transparent Substances.*—Dated May 6, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The nature of my improvements relates, in the first instance, to obtaining the greatest possible amount of light for places which would usually be dark, and where it is necessary, in obtaining light, to keep in view great strength or resisting power in the illuminating medium and its adjuncts, and such economy in material as will permit the illuminators constructed under this invention to be generally employed. I may term them grating illuminators, as they are, in fact, gratings filled with glass, in the manner hereinafter described. Assuming one of these gratings to be inserted into a ship's deck, it will be found that the light which enters the slips or slip of glass fixed edgewise in the openings of the grating will pass through with no greater diminution than would occur in a plate of polished glass of the thickness of the said grating, while the narrowness of the glazed apertures, combined with the depth of the glass, and the metal or other substance of which the divisions of the grating may be made, gives strength so great that heavy weights may be thrown upon or be rolled or dragged across the grating without injury thereto; and, further, while the brilliancy of polished glass is retained, the slipperiness of surface is avoided by means of the slightly raised edges of metal (or other substance) which form the divisions between the pieces of glass. For the sake of economy I use the waste cuttings (or cullett) of polished plate glass, and it will be observed that the slight irregularity of the edges of such cuttings or slips, caused in cutting by the glazier's diamond, are sufficient to prevent objects being distinctly visible through the lights. When superior finish is required, the edges may be polished and the same result obtained by rounding or bevelling the under edge of the slip. And I would here remark that, in order to transmit the whole of the light, it is necessary that the said slips

should be polished or have a bright surface on the sides or faces which are cemented to the divisions of the grating; for if the sides be rough or emeried, such of the rays of light which have an angular direction will as they reach such surface be lost by dispersion instead of being reflected to the opposite surface, and thence by several reflections transmitted to the bottom edge of the glass. The cement used should not unite in optical contact with the glass; plaster of paris will not, and I prefer to use that cement. The meaning of the term "optical contact" may be succinctly explained as follows:—Take a thick piece of polished plate glass with an even bright edge, place it horizontally before the eye, and lay a piece of black wax on the plane of the glass; on looking into the edge of the glass the wax so loosely placed or laid on cannot be seen; but melt a portion of the wax and drop it on the plane of the glass, and the portion of the glass so covered by the melted wax will appear as a dark space, showing that the light which reached this covered space has passed away from the glass and become absorbed by the wax. This first part of my invention is illustrated in the annexed drawing by diagrams 1, 2, 3, and 4.

The second part of my invention or discovery is illustrated by figs. 5 and 6 of the drawing, and carries the principle of internal reflection in a new direction. I make a solid parallelogram of fine and pure glass of any dimension (such being governed by the size and number of reflections I desire to produce), grind and polish this on all its sides and at both ends (the lower end, or that applied to or near the object, may be slightly bevelled or made angular if desired); this I term a designing glass, and its purpose is to show an object or objects placed in contact with or near its end, so pictorially arranged as to form a multiplied pattern or design. This instrument resembles the kaleidoscope, but possesses greater range; the objects are reflected parallel to each other, and as any fabric or texture can be used as a ground, the designer is enabled to judge of the effect of the pattern when worked up.

I will now proceed to describe the drawing, on which it will be seen that

Fig. 1, is a top plan view of a grating light, suitable for insertion into a ship's deck, the floors of warehouses, the roofs of houses, or any place where, while light is desired, a great resisting power is also required.

Fig. 2, is a longitudinal section taken through the line, A, B, at fig. 1.

Fig. 3, is a top plan view of a grating light to be let into the pavement of footpaths and other places, to give light to vaults or cellars, showing the light ready for use;

Fig. 4, is a cross section through the line, C, D, of fig. 3.

Fig. 5, is a side elevation of a designing or "object" glass.

Fig. 6, an end view of the glass; and

Fig. 7, side view of a transparent object, all hereafter described.

At figs. 1 and 2 it will be observed that I make a framing, *a*, of iron, wood, or other suitable metal or material (and they may be constructed either with the divisions fixed or separate, and then inserted and cemented in with the glass; I prefer the latter method); I then take plates of glass, *b*, and arrange and secure them in the framing both longitudinally and vertically; the divisions, *c*, are arranged so as to admit one, two, or more plates of glass between each of them. I secure the plates in position by fixing them with plaster of paris, or any other suitable cementing material that does not unite in "optical contact" with glass, and I so arrange that the upper edges of the plates of glass, as they lie in the compartments or divisions of the framing, do not come even with the upper surface or ribs of the grating, but allow it and them to interpose between the glass and the foot of the passenger, or any substance that may be wheeled or dragged over the grating light. It will be seen that the framing and glass form, as it were, a solid block (for, whatever the depth of the metallic or wooden grating bars, the glass portion is made as deep, with the exception before mentioned), which is let into the deck of a vessel or other place, and secured in position by screws or bolts through the side and end framing, or cemented or otherwise fastened therein. As the glass or plates of glass are embedded or secured in divisions, a fracture of one or more in a division or compartment is easily repaired without taking out the framing; namely, by punching out the broken glass, and refilling the cavity.

Figs. 3 and 4, are views of a circular grating light constructed in precisely the same manner as described in reference to figs. 1 and 2.

Fig. 5, of a square glass, *d*, or parallelogram, made of

fine glass, with sharp angles on all sides. This glass is capable of producing designs or patterns alone, but for the purpose of securing or fixing a design or pattern when a suitable one is obtained, I place it in a frame on a stand, *e*, *e*, with a set screw, *f*, to keep the glass, *d*, stationary.

Fig. 6, is an end view of the glass, showing the frame through which it is passed, and in which it can be turned round at pleasure, and mode of securing it in position by set screw, *f*.

Fig. 7, represents a glass cell, *g*, fitted with a metallic cap, *h*, and tightening screw, *i*. Objects of any kind, such as silks, or other fabrics, coloured or not, glass or other substances, transparent or opaque flowers, or parts thereof, being placed upon the plate of the cell, *j*, (which is then fixed in position,) will form patterns or designs; or when design glasses of very large dimensions are used, the glass is supported by two pillars, and works on an axle vertically; the objects, flowers or other, are then placed upon a stage of suitable elevation, and the lower end of the design glass brought to bear on them. The operator or designer on looking through the reverse or upper end of the glass discovers that the objects in the cell or in the stand (as the case may be) are arranged, by reason of the internal reflection of the glass, *d*, into a design, and that such design is multiplied in parallels, as aforesaid. Should that produced not suit him, he adds or substracts something to or from the objects, or simply disarranges them and looks again, or he moves the glass in its framing, and so changes the pattern or design. When he is satisfied with the pattern produced, he turns the set screw, *f*, so as to secure the glass in position, and proceeds to take the design or pattern on paper or any other material. The glass, *d*, is made, when desired, of such dimensions that both eyes may be used, and the multiplied design is thus made to appear as spreading over a considerable space.

Having now described the nature of my discovery or invention, and the means by which I carry it into effect, I desire it to be understood that, in the first part of my invention, I do not confine myself to any particular size, dimension, or form of grating lights, as they may vary to any extent, nor do I lay any claim to the exclusive use of any of the parts or articles used in their construction when taken as parts and not in combination for the pur-

poses of my invention; but I claim for and in respect of this part of my invention, the exclusive use of the combination of plates of glass with bright or polished surfaces, secured in frames or framing constructed and arranged in the manner hereinbefore described.

And as regards the second part of my improvements, being a discovery of a novel application of the principle of internal reflection within transparent substances, I claim the exclusive use of the solid parallelogram or piece of glass, *d*, for obtaining designs or patterns, as hereinbefore set forth and described.—In witness, &c.

OBED BLAKE.

Specification of the Patent granted to JONATHAN HAGUE, *of Ashton-under-Lyne, in the County of Lancaster, Overlooker, for Improvements in Machinery or Apparatus for Manufacturing Bands or Cords for Driving Machinery and other Purposes.*—Dated June 20, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My improvements relate to machinery or apparatus for manufacturing bands or cords from cotton, flax, hemp, or other fibrous substances, in which a series of strands or threads are twisted or twined together, and consists in an arrangement of apparatus whereby the strands or threads are kept at an equal tension as they are twisted or twined together and wound on to bobbins.

And in order that the same may be fully understood, I have appended to this my specification an illustrative drawing, which I will now proceed to describe.

Fig. 1, is a vertical section of one arrangement I employ; and

Fig. 2, a detached portion thereof. The cops of material intended to form the band or cord are placed in any required number upon a board or creel, as at *a*; the threads or stands pass from thence through a guide plate, *b*, and under a transverse rod, *c*, which rod is provided with projecting parts, *d*, and loops, *e*, for each set of threads. In this united form they are conducted through a trumpet, *f*, and from thence entirely around a shaft, *g*, after which

they are guided by pulleys, *h*, to the flyer, *i*, and bobbin, *k*. The flyers are mounted upon spindles, *l*, which are driven from the main shaft, *m*, by suitable gearing. Upon the spindles, *l*, are mounted loose wharves, *n*, the peripheries of which are held with a certain degree of force by a band, *o* (see fig. 2), the ends of which are attached to any convenient part which moves upward and downward with the bobbins. The bobbins rest upon the wharves, *n*, and the two are caused to rise and fall for the purpose of distributing the material by the copping rail, *p*, actuated in any ordinary manner. The shaft, *g*, is driven by suitable wheelwork, so as to revolve at any determined speed in proportion to that of the flyer, and this may be varied by the usual system of change-wheels. By this arrangement the shaft, *g*, may be caused to detain or give off the material at a quicker or slower rate, but maintaining an uniform tension; at the same time the flanges of the bobbins resting upon the wharves, *n*, will cause the latter to revolve against the friction of the band, *o*, and thus a drag will be effected for maintaining an uniform tension in winding on. At *q*, a portion of a cop is shown, the thread from which passes onward with those proceeding from below, and to this situation others may be transferred as they become unwound towards the bottom.

Figs. 3 and 4, represent a modification of the foregoing, and adapted to the purpose of twisting a number of cords or bands already manufactured by the machine, fig. 1. The bobbins, *k*, are mounted in a creel, *r*, and from them the twisted cords are passed over guides, *s*, and through trumpets, *t*, to a shaft, *u*; after passing around this they are turned around another shaft, *u* *, from which they are conducted by a guide roller, *v*, to the flyer, *i*. The friction wharves, *n*, are in this case each provided with a band, *o*, one end of which is attached to the copping rail, *p*, and from the other a weight, *w*, is suspended, in order to effect the required drag.

The shaft, *u*, is driven by gearing, as before described in reference to that of fig. 1, shown at, *g*, and is connected by wheelwork to *u* †, so that the two may revolve at the same surface speed. The bobbins, *k*, rest upon wharves, *x*, mounted loosely, but retarded by bands, *y*, one end of each of which is fixed and the other provided with a weight, *z*, by which means the unwinding of the material is regulated.

Having thus described and ascertained the nature of my said invention, and the manner in which the same is to be performed, I desire it to be understood that I claim, as secured to me, under the above in part recited letters patent, the methods above described for regulating the tension of the material, consisting of the shafts, *g*, *u*, and wharves, *n*, and their bands, or any modification thereof.—In witness, &c.

JONATHAN HAGUE.

Specification of the Patent granted to JOHN TALBOT PITMAN, *of* 67, *Gracechurch-street, in the City of London, for A New Method of Using the Electric Current or Currents for Telegraphic and other Purposes.*—Dated June 20, 1856.—(A communication.)

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—The invention consists in employing, for telegraphic and other purposes, the positive and negative current through electro-magnets, the poles of which are in juxtaposition, the latter being rendered by change of polarity alternately mutually attractive and repellant; thus enabling me to combine the local and relay magnets, or to use the combination simply as a relay with considerable increase of power.

In the modification in the use of currents resulting from placing the ends of a curved or rectangular armature opposite to the poles of the moveable magnet, this armature being acted upon by the approximation of the moveable magnet or axis, restraining the latter at the will of the operator, until the circuit in the moveable magnet or axis is broken.

In the employment of a current from one battery through the coils of both magnets, in direct order, to make them respectively attractive, or through one of them in inverse order, to render them respectively repellant, the circuit of the other battery, local or main, being, when made, oppositely directed. The use in this arrangement of a spring as a repelling power, when the magnets are attached, will permit all the local batteries to come in to aid the main circuit.

In the use of a breakpiece, a spring or its equivalent, to suspend the action of one of the magnets, in order to counteract or control the inductive influence in cases where a change of polarity is required.

In using (with or without the aid of a spring) the repellant instead of the attractive power, thus working from absolute contact.

The instrument may be described as follows:—P is the base, on which are placed the several parts that constitute the instrument. H, H, are two helices or coils, prepared in the usual way, that is to say, that one of the poles may be positive, whilst the other is negative; *h*, is another helix or coil, on a straight axis and prepared in like manner for opposite poles. These two electro-magnets have their poles placed in juxtaposition. The last-mentioned or straight magnet is suspended, so that it may have a vibratory movement, approximating to contact, and receding from the first or stationary one. In order to secure quickness or celerity of movement, I make the helix of the straight magnet hollow, and suspend only the axis, which is the form now represented. A, is a curved or bent armature of soft iron, belonging to the vibrating magnet or straight axis, and is provided with an adjusting screw, *a*, by which it can be advanced or drawn back. The stationary magnet has also an adjusting screw, *b*, for like purpose. B, C, are two posts, the first of which, as will be seen, is used in the form of this instrument to furnish a support to the axis of the suspended or moveable magnet. A small bar or rod, *r*, is attached to some part of the frame of the vibrating magnet or axis, so as to participate in the vibratory movement. This rod or bar has a projecting platina point on one side as at G, opposite to a similarly pointed screw fixed in the post, B. On the other post, C, is a spring e^1, or breakpiece, terminating in proximity to a second platina point on the vertical bar or rod. This latter spring has an adjusting screw, D. Still further up may be seen a small helical or other form of spring, F, having one end fastened to the vertical rod, *r*, and the other indirectly to an adjusting screw, *c*. The base or platform is furnished with thumb or binding screws, numbeered 2, 3, 4, 5, and there is also a thumb screw in the post, B, with respect to the latter, however, insulated. This is number one in the drawing.

I will now proceed to describe the operation of the

instrument, and at the same time explain the uses of such of the parts as require explanation. L, represents a battery, which we will assume is the local one; and in like manner, M, that belonging to the main line. Connect, for example, No. 2 thumb screw with the platina pole of the local battery, and No. 1 with the zinc pole. Trace the circuit, which will be found to pass through the stationary magnet, but before reaching the other pole of the battery the current undergoes alternate separation and union, by means of the spring or break piece, e^1; in other words, the circuit is perfected, only when the spring is in contact with the vertical bar or rod, so that it can pursue its path across to the thumb screw No. 1, and thence to the other pole of the battery. The axis of the suspended magnet, being subject at this moment to no other influence, is simply an armature for the fixed magnet, and obeys its call. Just before contact in its vibration, it causes the vertical rod to leave the spring so adjusted for the purpose, but the acquired momentum suffices to carry the aforesaid axis to the pole of the stationary magnet, where it is retained by inductive influence until the latter is in turn destroyed in manner now to be described, presupposing the connexions of the main battery as follows:—Connect No. 2 thumb screw, the same as connected with the platina pole of the local, with the zinc pole of the main battery, and No. 3, with the key, and the latter with the remaining pole of the battery. Trace the circuit, which, according to theory, will be from No. 3, through the straight magnet, and thence in opposite direction to the alternate local current through the stationary magnet, and thence to No. 2, and so to the battery. This main current passes through the straight magnet in a direction so as to produce, in conjunction with the passage through the stationary one, repellant poles. Suppose the main circuit broken, and therefore inoperative, the axis of the straight magnet, as before remarked, being an armature to the stationary one, moves towards the latter to absolute contact. Here no influence has been allowed save the inductive influence which is destroyed by the slightest cause. The most inconsiderable power aided by the spring, together with the advantage gained by absolute contact, is sufficient to effect this. The armature or moveable axis recedes by the action of the main current, and the invariable

armature, so termed, to distinguish it from the one which is alternately a magnet or armature, comes to the assistance and restrains it till commanded by the operator to return to a new contact with the poles of the stationary magnet.

In order to put this instrument in use in connexion with a register, one of the wires of the latter is attached to No. 1 thumb screw, and the other to No. 4, the circuit being opened or closed as the vertical bar vibrates between the platina pointed screw in post B, and spring, e^1.

The other methods of employing the electric current will be briefly described. Imagine the two helices, H, H, of the stationary magnet so wound as to produce the poles, and the vibrating magnet likewise so prepared, that its poles may be similar. Let the stationary magnet be connected with the local battery and the suspended one with the main; now, if we pass the current in one direction, through the moveable swinging magnet, so as to make its poles dissimilar to those of the stationary one, the poles of the two magnets will be mutually attractive, and as a consequence those of the moveable will approach those of the fixed magnet; reverse the current of either by means of a suitable key, and the two magnets before attracting will now be repellant, the poles being similar. This motion is produced and action imparted to any machinery connected therewith. The same result obtains if the helices should be wound in the more ordinary method; that is to say, each having its poles unlike. The change of polarity in the moveable magnet should be relatively the same as before.

Having sufficiently described my invention, what I claim and desire to secure by letters patent are,—

First, employing the electric currents through two electric magnets, the poles of which are in juxtaposition, one being suspended on an axis, and for telegraphic purposes, substantially in the manner or methods described in the foregoing specification.

Second, the collocation of the ends of a curved or rectangular armature opposite to the poles of the vibrating magnet, to be acted upon in the approximation of the latter, and in its turn restraining the moveable magnet till its current is broken; all as illustrated or described, or essentially the same.

Third, the working from actual contact, by employing a

break piece that leaves only the inductive influence in the stationary magnet, to be overcome by the main battery and assisting spring.

Fourth, using the more constant local current to draw up the armature that makes the contact for registering purposes in lieu of the main current, which is liable to prove inefficient.

Fifth, the provision for adjusting the position of the stationary magnet and curved armature, it being important that these should be brought into exact position relative to the axis of the suspended or vibrating magnet.—In witness, &c.

JOHN TALBOT PITMAN.

Specification of the Patent granted to PIERRE MARIE JOSEPH CHAMBLANT, *of* 36, *Rue de Lanery, Paris, for Improvements in the Manufacture of Glass.*—Dated July 31, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention consists in passing a current of air, gas, or vapour through glass when it is in a fluid state. For this purpose a platina pipe is caused to descend to the bottom of the pot in which the glass is contained, and the air, gas, or vapour is forced through the pipe by a pump, or other suitable apparatus. By these means the glass is perfectly mixed, and in some cases its colour is improved: for example, in the case of glass made with sulphate of soda and charcoal, if the charcoal is in excess it colours the glass, and this colouring can be removed by forcing air through it. By forcing air, gases, or vapours through coloured glasses, the degree of oxidation of the colouring metals can be altered, so as to produce the tint required.

Having thus stated the nature of my invention, I will proceed more fully to describe the manner of performing the same.

Description of the Drawing.

Fig. 1, shows a section of a glass furnace, and of one of the pots or crucibles in which the operation is performed.

A, B, C, is a bent platina pipe, which must be made without soldering; the bend, B, and the extremity, C, are strengthened by an outside lining, as shown in the drawing. On the end, A, of the tube is a rose or grating, which at its greatest diameter is pierced horizontally with conical holes, the smallest ends of the conical holes being at the exterior.

Fig. 2, shows a side view, and

Fig. 3, a horizontal section, of the rose or grating separately. The end, C, of the tube is fixed to an iron pipe; this pipe should be sufficiently long for the workman to be far enough away from the furnace, so as not to suffer from the heat. At the end, D, of this iron pipe there is a small tube, over which is fitted a flexible tube; the end, E, of this tube is fitted with a hollow plug, which fits into a socket connected with an air pump, or with an apparatus for forming gas or vapour. The flexibility of this tube permits the iron pipe to be moved about in any direction without interrupting the current of air or gas. The speed of the current of air or gas is regulated by the speed at which the pump is worked; or in those cases where the gas or vapour is of such a nature that it could not be transmitted by the pump, the speed of the current may be regulated by a tap, placed between the generator and the flexible tube.

When the glass in the pot or crucible in the furnace is melted, the pump or the generator is put in action, and the rose or grating on the platina tube is plunged nearly to the bottom of the melted glass. The air or gas is disengaged from the holes in the rose or grating in bubbles, which rise quickly to the surface, drawing with them the particles of glass, which offer resistance to them, and causing a double current, one ascending in the direction of the bubbles and the other descending in the direction of the glass, which replaces the particles of glass carried up by the bubbles. The rose or grating should be moved about in the pot or crucible, and particularly around its sides, so that the air or gas may act on the whole of the glass; a factitious boiling movement is thus produced, which should be continued for fifty or sixty seconds; the surface of the glass will then be covered with a layer of froth. The platina tube is then taken out, and passed into the next pot or crucible, where the same operation is performed, and so on for all the crucibles. If the furnace is well

warmed the froth on the surface of the glass will disappear a few minutes after the tube has been withdrawn. This operation is repeated for about six times to each crucible.

If the operation has been well conducted it will produce an intimate mixture of the parts, and produce a perfectly homogeneous mass. *Any chemical action may be produced by means of any gaseous substance which does not act on platina.

In passing a current of atmospheric air through the glass, all substances on which oxygen acts at a higher temperature will be burnt or oxidized. By passing a current of hydrogen gas, carbonic oxide, or any hydrogen vapours whatever, the sulphates, phosphates, &c., will be reduced, and reduce the metallic oxides to the lowest degree of oxidization, or even precipitate them in their metallic state. A current of steam will decompose or volatilize the chlorides which are sometimes contained in the glass in a hurtful proportion. In the same way, by forcing in other gases or vapours, different chemical changes can be produced.—In witness, &c.

PIERRE MARIE JOSEPH CHAMBLANT.

Specification of the Patent granted to CHARLES TITTERTON, *of Roehampton, in the County of Surrey, for Improvements in the Manufacture of Zinc and Zinc White.* —Dated November 5, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—My invention relates,—

Firstly, to an improved method of employing the refuse skimmings and dross obtained from various branches of manufacture where zinc is employed; and in using such matters, and whose masses conglomerate, being metal mixed with and coated over with oxide, I place them in muffles as follows, and obtain the products during the process of manufacturing the white oxide of zinc. The muffles or retorts marked B, in figs. 1, 3, and 4, are made of fire clay, as shown in drawing, and provided with outlets, one near the bottom, to allow the zinc to run out into the niche, C, and one near the top, in which is placed a

short pipe of the same material as the muffle, to allow the escape of the metallic vapours into the oxidizing chamber, and one end of the muffle is also open for a door, and the convenience of charging, discharging, and cleaning out. At starting, when the muffles are brought up to a state fit to receive the charge, I mix the same with one-third its weight of coke or carbon, and introduce the same into the muffle by a shovel or other suitable tool, first placing clay stoppers in the exit pipes to prevent any of the charge escaping into the niche, c, and stop the current of air through the muffle, which would tend to their detriment; as soon as charged I withdraw the clay stoppers, and placing the door in its place it is to be made air tight by a luting of clay; the operation then proceeds, and when completed I remove the door from the end of the muffle, first placing the clay stoppers in the exit pipes; rake out the ashes and recharge, as before described.

Secondly, when using oxides of zinc in the manufacture of white oxide of zinc, I use two chambers, or one separated, as shown in fig. 3, the one chamber to receive the first products, containing for the most part the oxide of cadmium, afterwards to be treated in the well-known way to obtain pure cadmium; the other chamber to contain the white oxide of zinc.

Thirdly, the sieve or screen is to be constructed of wire gauze fixed in a frame of suitable size, such frame being hung in a sloping or horizontal position, with leather or other suitable flexible material, and to be elevated by means of a pulley or wire the required height, and then to drop or strike against a stop, whereby effectually to shake the screen or sieve and detach the oxide therefrom, allowing the free escape of the vapours into the flues.

Fourthly, the invention consists in subjecting white zinc to great pressure, when contained in a strong holder; the requisite pressure being obtained by hydraulic, screw, or other powerful presses acting on a suitable ram or forcer fitting or passing into the holder.

Fifthly, in rendering white oxide more dense, and at the same time to improve the colour by heating it in a clay retort or muffle to a moderate red heat, and afterwards quickly cooling it.

Firstly, I claim the method of obtaining zinc and oxide of zinc from the refuse skimmings and dross in cases where such contain metallic zinc, shelled or coated by

oxide, in the process of manufacturing oxide zinc from such refuse.

Secondly, I claim the method of obtaining cadmium from zinc ores in the process of manufacturing white oxide of zinc.

Thirdly, I claim the suspending the sieve or screen (for the escape of the vapours) in leather or other suitable flexible material around the frame, allowing the requisite play, by which means it is effectually shaken.

Fourthly, I claim subjecting the oxide zinc to great pressure by hydraulic, screw, or other powerful presses, as described, whereby the density is greatly increased, and its covering powers brought to nearly equal white lead, overcoming a great objection hitherto existing to the use of white oxide zinc.

Lastly, I claim rendering the oxide zinc more dense, and at the same time improving its colour by heating it to a moderate red heat, and then rapidly cooling it.—In witness, &c.

CHARLES TITTERTON.

Specification of the Patent granted to JOHN LORD, *of Rochdale, in the County of Lancaster, Flannel Manufacturer, for Certain Improvements in the Process of Separating or Recovering Animal Wool or Silk from Cotton and Woollen, or from Cotton and Silk, or other Mixed Fabrics, whereby the Animal Wool or Silk is rendered capable of being again Employed, which said Improvements are also Applicable to Wool in its Unmanufactured State.*—Dated September 29, 1856.

To all to whom these presents shall come, &c., &c.—These improvements consist,—

First, in testing the acids employed in such process by the use of alkali, instead of the ordinary means of testing by hydromoters.

Secondly, in neutralizing the acid during the working of the process without the immersion, and the consequent second drying of the rags, &c., as hitherto.

The method of testing the acid is as follows:—If the acid be required four degrees Twaddle's hydrometer No. 1

strong, take a quantity of such acid and ascertain what strength of soda or other alkali it will require to neutralize the acid in equal quantities; then, if the dilute acid stands at any given strength in the vessel by the hydrometer, I can by alkali test detect any errors. For instance, if the dilute stands at four when the goods are immersed, and when taken out if the glass indicates five, it is then obvious the glass does not indicate correctly; should it require, say, for example, eight strong of soda to neutralize four strong of acids by the alkali test in the following way, take any given quantity of dilute acid from the vessel, then take the same quantity of soda water alkali of eight strong and mix the same in a glass graduated to the hydrometer preferred; the liquids will effervesce; should the effervescence cease, or the acid become neutralized before equal quantities of acid and alkali are in the glass so graduated, then the acid is so much too weak; on the other side, if it takes more alkali than equal quantities the acid is too strong. If the glass to contain the two liquids be graduated to the hydrometers, then, as much as the said glass indicates too strong or too weak, the said must be set accordingly. In all cases of fresh acid it will be necessary to ascertain by trial what strength of alkali it requires to neutralize equal quantities of acid. In testing the acids by alkali to be accurate, care must be taken the two liquids be mixed together well, and litmus or test paper must be used to ascertain when the acid is destroyed, or otherwise, as, when there is any acid in the glass graduated to the hydrometer the litmus paper will become red; when the alkali is strongest the litmus paper will become bluer than previously; when the acid is neutralized litmus paper retains its original blue.

The improvement in neutralizing the acid is by means of mixing soda water with olive or other vegetable oil; the alkali will neutralize the acid, thereby saving the immersing of the materials under operation in lime water, &c., as heretofore done, and also saving the consequent second drying of the same. The oil must have sufficient strength of alkali to neutralize the acid, and will by this means of neutralizing be a considerable saving of oil, and becomes a greasy quality, and will not corrode or be otherwise injurious to the machinery employed in the requisite subsequent processes of carding, &c., the proportions I prefer for the above purpose being about as follows:—To

three pounds of soda add twelve quarts of water, to stand from four to eight Twaddle's hydrometer No. 1, then mix the above with eight to twelve quarts of oil; or may also use eight quarts of soda water with four quarts of lime water the same strength, then mix with oil the same as before; but any alkali of the same strength will neutralize the acid in the course of working.—In witness, &c.

JOHN LORD.

Specification of the Patent granted to GEORGE ELLIOT, *of Newcastle-upon-Tyne, for Improvements in the Production of Oxides of Manganese.*—Dated October 13, 1856.

To all to whom these presents shall come, &c., &c.—My invention of "Improvements in the Production of Oxides of Manganese" has for its object the production from the solutions of chloride of manganese, arising from the manufacture of bleaching powder or otherwise, of an oxide of manganese, which can be employed for the purposes for which ordinary manganese is used, or which by a subsequent treatment can be converted into a hydrated peroxide of manganese, and this object is accomplished by means of the processes hereinafter described.

The first process consists in purifying the chloride of manganese produced from ordinary commercial manganese in the manufacture of bleaching powder or otherwise from the iron contained therein. For this purpose I take a solution of chloride of manganese and precipitate therefrom the iron contained therein by carbonate of lime, common chalk being the form in which I prefer to use the carbonate of lime; I then separate the clear solution containing chlorides of manganese and calcium (muriates of manganese and lime), and I precipitate therefrom by lime a protoxide of manganese, and I wash the protoxide of manganese clean from the muriate of lime.

In this process I expose as little as possible the protoxide of manganese to the action of the air, and I prefer the use of close vessels or tanks, so that the protoxide of manganese may not absorb oxygen from the atmosphere. It is not essential to separate the precipitated iron from the solution previous to precipitating the protoxide of

manganese, which is to be used to precipitate oxide of iron from solutions of chloride of manganese; and in that case lime may be used to precipitate at once both the iron and protoxide of manganese, instead of first using carbonate of lime to precipitate the iron, and then lime to precipitate the protoxide of manganese; but I prefer the first method, as affording less bulk to be washed clear of chloride of calcium.

I now take another portion of the solution of chloride of manganese, and I mix with it and agitate the precipitated protoxide of manganese, the recovery of which has been above described, and I thereby precipitate the iron held in solution therein; but if on testing I find after thorough agitation all the iron has not been precipitated, I add more protoxide of manganese till it is all precipitated. I separate by filtration or deposition the solution of chloride of manganese from the precipitated iron. I boil this solution down to a salt, either in iron or other vessels, or in a reverberatory furnace, and I then expose this salt to heat in reverberatory or other furnaces; but as it is important that the heat should be gradually applied, I prefer for this purpose using the furnace described in the specification of William Longmaid's patent for "Treating Ores and other Minerals to Extract Sulphur therefrom," dated the 20th of October, 1842. The chloride of manganese is placed on the bed furthest from the fire, where it remains about twenty-four hours, and is then moved on to the adjoining bed, where it also remains about twenty-four hours, and so on, till it arrives at the bed nearest the fire, where it is exposed to the greatest heat. The material must be occasionally stirred. I do not confine myself to the exact time the material remains on each bed, nor to any particular form of furnace. A current of steam may be admitted into the furnace, as it facilitates the decomposition of the chloride of manganese, but if much water was left in the boiled-down salt of manganese it is not required. The chloride of manganese is thus decomposed; muriatic acid is produced, which is to be condensed, by the processes in ordinary use by the manufactures of sulphate of soda, from common salt, and an oxide of manganese is formed, which is a mixture of protoxide and peroxide, and which can be employed for the purposes for which ordinary manganese is used; but I prefer to submit it to an additional process to separate the protoxide from

the peroxide. For this purpose it is acted upon cold by weak muriatic acid, which dissolves off the protoxide, leaving a hydrated peroxide and a small portion of protoxide not dissolved out. The solution resulting from this operation is boiled down and treated in the same manner as the solution of chloride of manganese resulting after purification from iron.

Having thus described the nature of my invention, and in what manner the same is to be performed, I would have it understood that I make no claim for the separation of protoxide from peroxide of manganese by the use of muriatic acid, neither do I claim the recovery of muriatic acid from the chloride of manganese;

But what I do claim as of my invention is the purification of chloride of manganese from iron by protoxide of manganese, and the recovery of a mixed protoxide and peroxide from the chloride of manganese, by the processes above described.—In witness, &c.

George Elliot.

Specification of the Patent granted to John McInnes, *of Liverpool, in the County of Lancaster, Oil Merchant, for An improved Surface Mineral Coating for Protecting Iron and other Substances, and an improved Vehicle or Varnish by which it is applied, and which Varnish may be used with or without the addition of other Substances.*—Dated October 10, 1856.

To all to whom these presents shall come, &c., &c.—My invention consists in the use and application, as a protective surface coating for the preservation of iron, wood, and other substances, of the mineral substance known in commerce as emery or corundum, when reduced to an impalpable powder, and which I apply to the surface to be coated by means of any suitable varnish or vehicle; but I prefer to use an improved varnish or vehicle; to make which I take gum lac (shell lac, by preference), and dissolve it in spirits of wine, in the proportion of, say, six pounds by weight to every gallon of spirit; I then add thereto, say, about one-fifth part by measure of castor oil, and a small quantity of liquid ammonia may also be added. For economy's sake, I sometimes use the mythelated spirits of

wine of commerce, in place of the pure spirits of wine, and which I have found to answer the purpose nearly, if not equally well. This my improved varnish or vehicle may be used as a protective coating alone, or mixed with other substances, such as ground flint, ground glass, sand, or other like substances; but I prefer to use emery, as from its composition and hardness, it containing nearly eighty-seven per cent. of aluminium, a substance which is not acted upon, and is unchangeable under any circumstances, and which is therefore well adapted for the object I have in view; for although emery can be used with great advantage as a protective coating for various purposes, such as iron roofs, leaden cisterns, water pipes, steam boilers, wood and iron work of all kinds, and, indeed to all exposed surfaces requiring protection from atmospheric and other influences for which oil paint is now used, my principal object is its application to the protection of iron-built ships, both internally and externally, where it is of the first importance that the solid matter forming the paint or coating should be perfectly unacted upon by the various salts and other substances found in sea water; otherwise a decomposition of the paint takes place; as, from experience, I have found, when a metallic oxide is used, such as the oxide of lead (red lead), reduction takes place, and consequently great injury arises to the iron from the contact of two dissimilar metals.

To form a mixture of my improved coating to be applied to a smooth surface, I mix with any suitable vehicle, but, by preference, my improved varnish, hereinbefore described, sufficient powdered emery to bring the mixture to the consistency of thick cream, and then apply one, two, or more coats to the surface to be protected in the same way as common oil paint is now applied. When the surface to be coated is not smooth, but it is desirable to make it so, I add sufficient emery powder to make the composition of the consistency of putty or stiff paste, and apply it with a trowel or palette knife. This stiff composition I propose to use to fill up the spaces between the butts or ends of the plates, where they are jointed in the construction of iron ships, and for covering the rivet heads to preserve the same from corrosion. The spirit contained in the mixture, evaporating quickly, leaves the substance of a stony hardness, and which cannot be acted upon by moisture or steam.

Having now fully described my said invention, and how the same may be performed,

What I claim is,—

First, the use and application of emery or corundum, in combination with the improved varnish or vehicle for a protective coating, as hereinbefore described.

Secondly, the use of emery or corundum, when used as a protective coating, as hereinbefore described.

Thirdly and lastly, the use and application of the improved vehicle or varnish, as hereinbefore described.—In witness, &c.

JOHN McINNES.

Specification of the Patent granted to WILLIAM MARRIOTT *and* DAVID SUGDEN, *of Huddersfield, in the County of York, Agricultural and Manufacturing Chemists, for an Improvement in Purifying Coal Gas.*—Dated October 7, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in purifying coal gas. Heretofore in some cases sulphuric acid in the fluid state has been employed for such purpose, and the purification of the gas has been accomplished by passing the gas up through a quantity of the acid, the gas having to overcome the pressure of the column of fluid acid through which it has had to force its way.

Now, our improvement consists in employing sulphuric acid by what may be called the dry process, by combining sawdust, or other vegetable fibrous matter, or shoddy, or like animal matter, with the sulphuric acid, which matters becoming charred by the acid produce a compound of sulphuric acid, and such charred matters, suitable for being used in dry gas purifiers, presenting a large extent of surface of the acid to the gas, and offering considerably less resistance to the gas in its passage amongst such surfaces. The matters thus used for purifying gas are after such use very suitable for manure.

Having thus stated the nature of our said invention, we will proceed more fully to describe the manner of performing the same.

The object of the invention is to separate the ammonia from gas by the application of sulphuric acid combined with wood, or vegetable, or animal fibre combined, in order that the acid may be used in what are called dry gas purifiers.

In carrying out the invention it is preferred to employ wood sawdust combined with sulphuric acid, and in practice we have found that the acid is most advantageously employed when at a specific gravity of 1·425. We do not, however, confine our invention to the use of that strength. The sawdust, or other woody or vegetable or animal fibre in the dry state, is first combined with the acid, and for each hundredweight of dry wood sawdust we apply about 168 lbs. of acid of the strength abovementioned, but we do not confine ourselves to these proportions, and when the same have been well and intimately mixed it is exposed to a heat of about two hundred and fifty degrees Fahrenheit, in a stove or otherwise, until the woody or vegetable or animal fibre is thoroughly carbonized, and the sulphuric acid absorbed by the carbon; thus formed in this state it is a light and dry porous matter, and offers no obstruction to the passage of the gas. We apply the compound on the shelves of ordinary dry gas purifiers in the same manner as other materials are used in such descriptions of purifiers; we, however, first spread on the shelves a quantity of those materials which have been previously used, and which are well saturated, in order to prevent the fresh materials coming in contact with the shelves, so as to injure them by the action of the acid, and on such layer on each shelf we spread over two or three inches of the fresh materials. In order to ascertain whether the gas is thoroughly freed from ammonia, we from time to time test it with turmeric paper, which will be turned to a reddish colour if there be ammonia present, but will remain unchanged when the gas has been purified from ammonia. Other fibrous vegetable or animal matters may be used in a similar manner with the sulphuric acid, but, as before stated, it is preferred to employ wood sawdust.

Having thus described the nature of our said invention, and the manner of performing the same, we would have it understood that

What we claim is,—

The application of sulphuric acid in dry gas purifiers, first combining the acid with wood or other vegetable fibre or with animal fibre so as to thoroughly carbonize the same. —In witness, &c.

WILLIAM MARRIOTT,
DAVID SUGDEN.

Specification of the Patent granted to JOSEPH BENNETT HOWELL, *of Sheffield, in the County of York, for Improvements in the Manufacture of Cast Steel.*—Dated October 9, 1856.

To all to whom these presents shall come, &c., &c.— The novelty of my invention consists in using what is commonly known as the scale which falls off steel or iron during the process of hammering or rolling, in addition to the ingredients in common use for making cast steel. I do not confine myself to the use of any given quantity of the said scale, as that must be determined by the particular temper of steel required for any special purpose. The object of this invention is to make a superior quality of cast steel or a homogeneous metal from the commoner kinds of iron.

Having now described the nature of my said invention, and its use,

What I claim as my invention is,—

The application of the within-named scale to the manufacture of cast steel.—In witness, &c.

JOSEPH BENNETT HOWELL.

Specification of the Patent granted to OGLETHORPE WAKELIN BARRATT, *of Birmingham, in the County of Warwick, Chemist, for Improvements in the Dyeing or Staining and Ornamenting of Articles of Pearl, Bone, and Vegetable Ivory.*—Dated October 7, 1856.

To all to whom these presents shall come, &c., &c.— This invention relates to a mode of imparting a permanent

dye or colour to articles composed of pearl, bone, or vegetable ivory. To this end, instead of using vegetable dyes as heretofore generally employed, I obtain the required tints from solutions of the metals, and the salts and oxides of the metals. The chemical qualities of the metallic solutions I so modify as to ensure the setting up of a chemical action when the substance to be dyed is immersed in the liquid, and the displacement of an ingredient of that substance by the metal or metallic compound. Thus, for example, when I desire to stain pearl of a green colour, I take a solution of sulphate of copper and (according to the depth of colour) some bichromate of potash. The presence of this substance in the solution will set up the requisite chemical action, and ensure the deposit of the metallic salt in the body of the pearl, thus imparting the green tint desired without obscuring the pearly lustre. To obtain a scarlet colour, I use iodide of mercury; for crimson, chromate of silver; for greens and blues, salts of copper, and so on, taking care in all cases to provide such chemical affinities as will ensure the desired chemical action as above indicated. I also propose to ornament buttons and other articles by applying several colours thereto. To this end, I first stain them one colour, and then cut away or otherwise remove the colour in parts; I then apply another colour, and so on, or I leave the pearl unstained in parts of the button or other article, which will then show green and pearl, crimson and pearl, or any other combination of colours that may be desired.

In order, however, that my invention may be clearly understood, I will now explain in detail the whole process to which the articles to be dyed are subjected. Supposing, for example, I desire to dye or stain articles of pearl, bone, and vegetable ivory of a pale green colour, I form the necessary solution as follows:—I dissolve one hundred ounces of sulphate of copper in four hundred ounces of water (rain water or distilled water being preferred), in a suitable vessel; I then prepare the bone, pearl, or vegetable ivory to be dyed in the following manner:—Having first made a pickle composed of water containing one per cent. of nitric acid, sulphuric acid, or hydrochloric acid, when the articles made of pearl or bone contain an excess of lime, I use the pickle made with sulphuric acid; and when there is an excess of animal matter at the surface I use the pickle made with hydrochloric acid. The articles to be

dyed are first plunged into the above pickle, and allowed to remain until they are perfectly clean; they are then to be rinsed in clean water to free them from any adhering matter, and immediately placed in the colouring bath, and frequently well stirred, and care must be taken not to obscure the pearly lustre. As soon as the buttons or other articles have received the desired tint, they should be removed from the bath and well rinsed in clean water, and shaken out in sawdust, or wiped out, and then, if required, polished.

If I wish to transform the sub-sulphate of copper obtained by the former process on the buttons or other articles into bibasic carbonate of copper (malachite), I plunge them into a dilute solution of bicarbonate of soda for a short time; and if I wish to stain them of a dark blue colour, I put them into a solution of lime for a short time, and when they are taken out, they must be well rinsed in clean water, and dried in sawdust, as in the former instance. I would remark, that by using phosphate of soda in place of bicarbonate of soda, a blueish green is obtained. I also propose to dye or stain articles of pearl, bone, or vegetable ivory, by the use of a solution of nitrate of copper instead of the sulphate, and I form the solution as follows:—I dissolve one hundred ounces of nitrate of copper in four hundred ounces of water in a suitable vessel. The articles to be dyed are to be pickled as before described, and are then to be plunged in the bath of nitrate of copper, and frequently stirred, care being taken not to carry the dye too far, or to obscure the shade of the pearl if that is the article operated upon. When the articles in the bath have taken the proper tint, they show a pale green colour with a blueish tint; they are then to be removed from the bath and well rinsed in plenty of water, and shaken out in sawdust. If I wish to transform the sub-nitrate of copper obtained on the articles into other colours, such as greens, blues, browns, &c., I, for the purpose of obtaining a green colour, convert the nitrate of copper on the articles into bibasic carbonate of copper (malachite), after which they are plunged into a dilute solution of bicarbonate of soda, until they have taken the proper tint; they are then to be rinsed in water and dried in sawdust. For a light blue colour, I leave the articles for a certain time in a saturated solution of bicarbonate of soda, when a double carbonate of copper

and soda of a sky blue colour will be obtained; the articles are then to be removed from the bath and rinsed in water, and shaken dry. For a dark blue, I plunge the articles dyed in nitrate of copper in a solution of lime, and when they have acquired the proper tint, they are removed from the solution, rinsed in water, and shaken out. If the buttons or other articles dyed in the nitrate of copper are immersed in a dilute solution of common subcarbonate of potash for a short time, they will appear of a fine blue colour; they are then to be removed from the bath and rinsed in water, and shaken in sawdust. For browns, I first produce on the articles to be dyed sub-nitrate of copper as before, or they may be dyed with the acetate or sulphate of copper; and if a light brown be required, I take the articles first dyed green with a salt of copper, and plunge them into a solution of iodide of potassium, and let them remain in the solution until they assume a brown colour; I then remove them from the bath, rinse them in water, and dry them. For a dark brown, I make a saturated solution of bichromate of potash, and I take the buttons and other articles dyed green by the former process, and immerse them in the solution until they show the required tint. I then remove them from the solution, and rinse them in water and dry them; the articles treated in the same manner with neutral chromate of potash give a bright green. To produce a deep brownish red colour, I make a saturated solution of ferro-cyanuret of potash. I first dye the articles green by the before described process, and immerse them in the solution until the red brown tint is produced. I then remove them from the bath, and rinse them in water and dry them. For a grey colour, I use two parts of hydrochlorate of ammonia, and one part of sulphate of copper dissolved in water. To make a solution to dye a light straw colour, I take one ounce of bichromate of potash, and fifty ounces of sulphate of copper, and dissolve them in two hundred and twenty ounces of water in a suitable vessel; after the work has been pickled, I immerse it in the solution, and stir it frequently until the light straw tint appears. I then remove the articles from the solution, and rinse them in water and shake them out. All the different shades of colour between a rich gold tint and a pale straw colour are obtained with this solution by varying the proportion of the bichromate.

In order to dye pearl, bone, and vegetable ivory of a black colour, the following process must be employed:—I first pickle the articles with diluted nitric acid in the manner already explained. In another vessel I dissolve one hundred ounces of sulphate of copper in five hundred ounces of water by measure, and one ounce of nitric acid, and one ounce of bichromate of potash; this forms the preparatory solution. I then form a silver solution as follows:—Ten ounces of nitrate of silver are dissolved in one hundred ounces of distilled or rain water, and I add thereto one ounce of pure nitric acid and twenty ounces of pure liquid ammonia. Having stirred the ingredients well together, the mixture is ready for use; the articles to be dyed black are plunged into the pickle bath, and in a few minutes they will be clean. They are then to be taken from the pickle bath, and well rinsed in water, and then immersed in the preparatory solution for a short time and stirred. They are then taken from the bath, and again well rinsed in water, after which they are to be placed in the silver solution for a short time and stirred therein; they are then to be taken from the silver bath and drained, and placed on boards to dry; when dry they are polished and finished in the usual way.

For dyeing pearl, bone, and vegetable ivory of a crimson colour, I first prepare a pickle of nitric acid as before, and I then make a solution to prepare the articles to be stained, for which purpose I dissolve in a suitable vessel four ounces of bichromate of potash in ninety ounces of water, and I add twelve ounces of nitrate of copper, and one ounce of nitric acid. Having stirred these ingredients together they are ready for use. To make the silver solution I dissolve in a suitable vessel eight ounces of nitrate of silver in one hundred ounces of water; I then pour into this solution six drachms of nitric acid. The articles to be dyed crimson are to be placed in the pickle, and allowed to remain until they are perfectly clean; they are then to be rinsed in water, and placed in the preparatory solution, and to be stirred in it for a short time, after which they are to be rinsed in water, and plunged in the silver solution for a short time, and when removed from this solution they are allowed to drain, and then placed on boards to dry; when dry they are polished and finished in the usual way.

In order to dye articles of bone and vegetable ivory of a

yellow colour, the buttons or other articles, after they have been pickled, are immersed in a saturated solution of acetate of lead, and left in the solution for several hours; when removed from this bath they are to be rinsed in water, and then plunged in a saturated solution of bichromate of potash and stirred for a short time, and when removed from the bath they must be rinsed in water and dried. Various colours may be produced by employing solutions of acetate and chloride of cobalt in the first place, and then treating the articles with various chemical agents, according to the colours required. For this purpose I take a solution of the chloride or acetate of cobalt, and immerse the articles to be dyed in it for several hours; I then take them out and rinse them in water, and place them in either of the following solutions to obtain the different colours. For a blue colour a solution of common potash is employed; to produce a red colour bicarbonate of potash in solution is used; for a green a solution of ferrocyanuret of potash, and for a grey a solution of chromate of potash, may be employed. In order to produce a lilac colour a solution of phosphate of soda is required; and for a rose colour a solution of dilute oxalic acid; a pink colour is obtained by means of a solution of the biborate of soda. In order to stain or dye of a crimson red the solution is made as follows:—I dissolve the perchloride of mercury in distilled or rain water to saturation, and after pickling the articles I rinse them in water, and then plunge them in the bath of perchloride of mercury, where they are left for three or four days, taking care to stir them from time to time; when they are taken out they must be rinsed well in water, and then immersed in a solution of iodide of potassium, and when the red tint appears they must be removed from the bath, and rinsed well in water and shaken until dry.

In order to dye bone or vegetable ivory a black or bronze colour or dark browns, I find it convenient to make use of certain vegetable dyes in conjunction with metallic salts, for which purpose I take fifteen ounces of hydrochlorate of ammonia, and ten ounces of sulphate of copper, and dissolve them in one hundred ounces of water, in which I place some pieces of metallic copper for the purpose of reducing the compounds. I then prepare a colour with Campeachy wood, Lima wood, or catechu. For example, in order to dye a dark brown I take one

hundred ounces of colour made with catechu, and ten ounces of the reduced copper solution, in a suitable vessel. The articles to be dyed are to be pickled and rinsed in water as already described, and then plunged into the colour bath: this gives a dark brown colour. Campeachy wood treated in the same manner gives a black colour.

In order to ornament buttons and other articles made of pearl, bone, or vegetable ivory, and dyed or stained according to my improvements already described, I first dye the surface of the article of any desired colour according to any of the processes above described, after which I cut away in parts through the surface colour, and I then dye the parts so cut away blue, green, yellow, red, grey, or any other colour, or if preferred the parts cut away may be left in the natural and undyed state, so that the button or other article will present a highly ornamental appearance.

Having now described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the exact details or quantities herein set forth, as the same may be varied in some particulars without departing from the nature and object of my improvements. In conclusion, I claim the use and application of the processes herein described, or any mere modification thereof, for dyeing, staining, or ornamenting articles made of pearl, bone, or vegetable ivory.—In witness, &c.

OGLETHORPE WAKELIN BARRATT.

Specification of the Patent granted to SAMUEL CUNLIFFE LISTER, *of Manningham, near Bradford, York, for Improvements in Preparing and Spinning Cotton, Flax, and Similar Fibres.*—Dated September 13, 1856.

To all to whom these presents shall come, &c., &c.—Having recently patented the process of spinning cotton wet I have since discovered that much stronger and smoother yarn may be produced by first combing the cotton, so as to take out the short fibres, and then spinning the combed cotton wet.

I will now proceed to describe the plan which I adopt to carry out my said invention. I take the cotton and pass it through a beating machine, so as to clean it from dust and dirt, and after that I card it, in order to obtain good sliver suitable for combing. The carded slivers are then combed in order to separate the long fibres from the noil and dirt; having thus perfectly cleansed the cotton from all extraneous matter, it is then drawn and roved in the usual manner. The combed cotton roving is then subjected to a process of wet spinning, which I prefer to be as follows:—A trough containing hot water is placed behind the drawing rollers of the spinning frame, through which the combed cotton sliver is passed; it is then taken hold of by the drawing rollers, and drawn and spun, as is well understood.

Now what I claim as of my invention is, the combined process of first combing and then spinning such combed cotton wet, whereby very superior yarn may be produced.

When preparing and spinning flax and similar fibre, the following process will be found highly useful:—First reduce the flax to a state of "flax cotton," that is, to its ultimate fibre, so that the length of the fibres shall not much exceed those of long cotton, then comb it, and then spin the product wet in the usual way, by which means better yarn will be produced than by any of the processes now in use. It is important, when carrying out this part of my invention, that the flax should be reduced to a state of "flax cotton," that is, to its ultimate fibre, by chemical or mechanical means, or by both combined. This I prefer to accomplish by boiling it in a solution of caustic potash for two or three hours, and then passing it through heavy rollers (similar to such as are now used for washing wool), so as to squeeze out the gluten and colouring matter. If this is not sufficiently accomplished by one operation, the flax should be again and again immersed in the boiling solution, and passed through the expressing rollers until the gluten is entirely removed and the fibres set free, so that when dried and well carded, the fibres shall not much exceed those of long cotton. Sometimes, after being dried, the fibrous material is very much felted and matted together; in that case it should be passed through a beater or teazer, so arranged as to tear in pieces and open out the fibrous mass, which will greatly assist the after operation of carding; the carded sliver of fibre should then be well combed, and the longer fibres

separated from the short, also from the dirt and other objectionable matter, and then drawn, roved, and prepared for spinning in the ordinary way of preparing short fibre. But I would remark that, when being spun, I prefer not to treat it in the usual way of flax spinning, but in the way that cotton is usually spun wet, that is to say, instead of placing the rollers of the spinning nearer together than the length of the hackled or combed fibre, as is now practised, I place the rollers further apart than the length of the fibre in the roving. When spinning flax in the ordinary way, the roving is passed through a trough of heated water to soften the gluten which holds the ultimate fibres together in a bunch, so that when the drawing rollers take hold of the ends of the fibres, they readily draw out and separate from each other. Now, by my process, although I pass the roving through hot water, it is to give cohesion and strength to the yarn when spun; there is no softening of the gluten or separation of the ultimate fibres from each other by the action of the drawing rollers, because all the gluten has been already removed, and all the fibres reduced (so far as is needful or practicable) to ultimate ones before being spun, so that if the drawing rollers in the spinning frame were set nearer together than the length of the fibres composing the roving, as is now practised, they must be broken. Although I pass the roving through hot water in the usual way, still as the fibres have been already (by the process described) reduced to ultimate fibres, that is, to their ultimate length and fineness, they cannot be further reduced, but would be broken; it is for that reason that I place the drawing rollers in the spinning frame further apart than the length of the fibres composing the roving.

What I claim as my invention is,—

The combined process of first, reducing the flax or similar fibre to a state of "flax cotton," that is, to its ultimate fibre, or nearly so; then, combing the same, and afterwards spinning it wet; but I do not confine myself to the precise manner herein described, so long as the peculiar character of my inventions be retained.—In witness, &c.

SAMUEL CUNLIFFE LISTER.

Specification of the Patent granted to Cornelius Ferguson Clements, *of Liverpool, for An improvement in separating Copper and other Metals from Ores containing them.*—Dated September 15, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in separating copper and other metals from ores containing them; and the invention consists of applying muriatic acid vapours to act on ores containing copper and other metals. The ores for this purpose are to be in the state of oxides, and the muriatic acid vapours, from furnaces used in the manufacture of sulphate of soda, are to be conducted into a suitable apparatus, together with water or steam, so as to act on the ores contained in the apparatus. The liquids thus obtained are to be treated by ordinary well-known means for separating the copper and other metals therefrom.

This invention is peculiarly applicable where the manufacturing of alkali is carried on, and where the vapours of muriatic acid may be obtained at the cheapest rate, and also where pyrites are used in manufacturing sulphuric acid, as although my invention is applicable in treating other ores containing copper in a state of oxide, it is more peculiarly applicable to pyrites which have been burned in making sulphuric acid.

In carrying out this invention, the burned pyrites, or, it may be, other ores having copper in the state of oxide, are packed or filled into a chamber of any suitable dimensions, according to the extent of the works. The chamber is to be provided with an inlet for the vapours of muriatic acid, and also for steam, also an outlet for the passage away of vapours from the chamber, and such passages are to have slides or valves to regulate the flow. The muriatic acid vapours are to be caused to pervade the chamber, so as to act on the burned pyrites or other ores contained therein. By thus applying muriatic acid vapours the copper will be converted into a chloride of copper, the steam serving only so as to open the pores of the burned pyrites, and keeping up the temperature, but not actually dissolving the chloride.

The vapours of muriatic acid are to be allowed to flow through the chamber until all the oxide of copper is completely converted into chloride, which process may be completed in a few hours; but to be quite safe, and in order to carry on the operation regularly, the burnt pyrites are left exposed to the influence of the muriatic acid vapours for twenty-four hours, when the muriatic acid vapours are shut off, and conducted into another similar chamber containing burnt pyrites. The pyrites from the first chamber is removed from it (after it has sufficiently cooled down) into large wooden vats, provided with filterers in the bottom, hot water is turned on, and the chloride of copper is thus washed or dissolved out, leaving the oxide of iron behind as a residuum. The solution of copper thus obtained is to be treated in the ordinary well-known manner to separate the copper therefrom.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I do not confine myself to the details herein explained;

But what I claim is,—

The mode herein described of separating copper and other metals from the ores containing them by the application of the vapours of muriatic acid.—In witness, &c.

CORNELIUS FERGUSON CLEMENTS.

Specification of the Patent granted to JOSEPH GILBERT MARTIEN, *of Newark, New Jersey, in the United States of America, but at present of* 32, *Essex-street, Strand, London, for Improvements in the Manufacture of Iron.*—Dated September 16, 1856.

To all to whom these presents shall come, &c., &c.—The subjecting fluid iron as it flows from a smelting furnace to the influence of gas or gases, separately or combined, and in a natural or heated state, also to the influence of any alkaline, earthy, mineral, or metallic substance, or matter separately or combined, has been set forth in my Patent, dated April 4, 1856.

Now, this invention consists in applying to and disseminating through and amongst fluid iron, or fluid metal possessing the characteristics of iron of any kind, form, or description whatsoever, as it flows from or whilst in a transition state from a melting or remelting furnace, cupola, fire, vessel, or place of any kind or form whatsoever from which fluid iron may or can flow (except from a smelting furnace), atmospheric air, oxygen gas, chlorine gas, hydrogen gas, carburetted hydrogen gas, or any desirable vapour, gas, or gases, separately or combined, and in a natural state, or in a more or less heated state, as may be required, for the purpose of heating, oxidizing, deoxidizing, carbonizing, decarbonizing, purifying, strengthening, changing the nature of the metal, more or less, whatever the form, character, nature, or name the metal may have or be known by, in consequence wholly or in part of such treatment.

This invention also consists in applying to and disseminating through and amongst fluid iron of any kind, form, or description, as it flows from or whilst in a transition state from a melting or remelting furnace, cupola, fire, vessel, or place of any kind or form whatever, from which fluid iron may or can flow (except from a smelting furnace), nickel, or matter containing nickel, zinc in the form of an oxide, or otherwise; manganese in the form of an oxide, carbonate, carburet, or otherwise; carbonaceous matter of any kind, or compound containing carbon; kaolin, or any matter containing kaolin, chloride of sodium, chlorates, carbonates, nitrates, or any saline, alkaline, vegetable, earthy, mineral, or metallic matter or matters, separately or combined, and in any form, state, or condition that may be desirable for the purpose of oxidizing, deoxidizing, carbonizing, decarbonizing, purifying, alloying with the iron, or any matter contained in the iron, strengthening, changing the nature of the metal more or less, whatever the form, character, nature, or name the metal may take wholly or in part, in consequence of such treatment.—In witness, &c.

JOSEPH GILBERT MARTIEN.

Specification of the Patent granted to ALFRED LODWICK NEWMAN, *of New Church-street, Bermondsey, for Improvements in Processes for separating Animal from Vegetable Fibre, and for Adapting the Products to Manufacturing Purposes, and in the Machinery employed therein.* —Dated September 17, 1856.

To all to whom these presents shall come, &c., &c.—The object of this invention is to utilize waste pieces or cuttings of woven fabrics, consisting of a mixture of animal and vegetable fibres or substances, by destroying the vegetable matter and preserving the woollen fibre in a state suitable to be again used in the manufacture of textile fabrics, and also to cleanse unmanufactured wool from vegetable matters often found therein.

The first part of my invention consists of a process for protecting the animal fibre from the injurious action of the acids or other agents used for dissolving the vegetable matter. This process is as follows:—I take the mixed material from which it is desired to remove the vegetable matter without injuring the animal fibres, and saturate it by immersion in the two following solutions, that is to say, the one made of the following chemical agents, namely, alum, sulphate of alumina, sulphate of zinc, chloride of tin, acetate of lead or acetate of alumina (but I give the preference to the salts of alumina); the agent to be employed is to be pulverized and dissolved in the proportions of from one to five parts of the salt to one hundred parts of water; the exact proportion being determined by the nature of the fibrous material to be operated upon, the larger proportion of five per cent. being sufficient for the thickest and closest material. The solution may be used warm with advantage.

The other solution is composed as follows:—I take from 1½ to 7½ (according to the strength of the first solution used) parts of oleaic, stearic, or margaric acids, or of soap or other saponaceous or fatty matter, and dissolve it in one hundred parts of water (or the fatty, acid, or saponaceous matter may be dissolved in alcohol with advantage, and then added to the water); this solution should be used at a temperature of between eighty and ninety-five degrees Fahrenheit.

The object of the consecutive use of the solutions above described is to protect the animal fibre or material, and enable it to resist the action of the chemical acids or salts subsequently used for the destruction of the vegetable portion of the materials. After having thus protected the animal fibre or material, I proceed to destroy the vegetable substance by the use of any of the ordinary and well-known chemical agents usually applied for this purpose, such as, for example, chloride of lime, vegetable or mineral acids, or the sulpho salts, and the course I adopt for this part of the process is as follows:—I make a solution of the chemical agent, sulphuric acid, for example, of a strength varying from two to five parts of the concentrated acid to one hundred parts of water, using the larger or smaller quantity of acid according as the material to be operated upon is more or less dense and difficult of manipulation. Into this solution I immerse the materials until saturated, and then dry them thoroughly by artificial heat up to a temperature of two hundred degrees Fahrenheit, after which the vegetable substance may be shaken out as dust; a lower degree of temperature will suffice when the acid solution is strong, but the above degree of heat will be sufficient for the weakest acid solution above mentioned; or the material may, if preferred, be subjected to a temperature of about one hundred and ninety degrees, and then washed in water a little under the boiling point. By this means the vegetable substance is washed away, while the animal remains entirely unaffected in its strength, and is therefore suitable for manufacturing purposes. I would observe, that although I have described the operation as performed by sulphuric acid, which I consider the most advantageous, any other of the chemical agents mentioned above as usually applied to the destruction of vegetable substances may be used for the purpose with success. And, further, in consequence of the protection afforded by the processes first hereinbefore described, the destructive agents may be used of a strength greater than hitherto practicable without prejudicially affecting the animal substance, by which means the operation can be conducted with safety, and at a great advantage in point of time.

The above operations may be performed with the aid of any ordinary vats or utensils, and the drying may be done in chambers heated by open fires or flues, or any

of the usual methods of warming or drying; but I prefer to use the method of manipulation and the mechanical appliances hereinafter described, being the second part of my improvement, and forming the second part of my invention.

I place the vats containing the various solutions before described in the order in which they are to be used, and through these vats I pass an endless band or bands of webbing or other suitable material, on which the material to be operated upon is placed, and made to pass through the various solutions; the speed at which this part of the operation is conducted being regulated by ordinary and well-known mechanical means, so that the saturation in each solution shall be of more or less duration, as the density of the material or other circumstances may render necessary. On issuing from each vat, the band or bands on which the material is placed are passed between squeezing or pressing rollers, by which the surplus liquor of the solution is removed and returned to the vat; and on issuing from the solution of saponaceous or fatty matters hereinbefore described, where a drying operation is necessary, the band or bands, with the material thereon, (or the materials alone,) are made to pass over or between rollers or plates heated by ordinary means, such as steam or gas, to a sufficient degree of heat to deprive the materials of moisture in passing over or between them; after which the material is passed through the acidulated or other solution, and then completed by artificial drying alone, or by drying and washing, as hereinbefore described.

I would however have it understood that I do not claim the details of the arrangement of the vats, or of the system of endless bands, hereinbefore mentioned, but only the application of such details and arrangements to the manipulations requisite in the processes and for the objects hereinbefore described.

The third part of my improvements consists in an apparatus or arrangement for performing the operation of thoroughly drying the material, after saturation in the acidulated or other solution, which is constructed as follows:—I construct in a chamber erected for the purpose, either on brickwork or iron, or partly of both, a series of boxes or cylinders placed one above the other with spaces between them, which boxes or cylinders I heat to a consi-

derable temperature by gas, steam, or other means, steam being in my opinion preferable. Through these boxes or cylinders, which are supported at the sides only, I direct jets of steam, commencing at the lowest in the tier, through which it passes and escapes by a suitable pipe or communication into the one above, and so on throughout the series, and finally into an eduction pipe or into a condenser outside the chamber; or this operation may be reversed, and the steam passed from the highest to the lowest box or cylinder. Round these boxes or cylinders I pass, on rollers, an endless band or ladder composed of a flexible material on either side, with wooden or metal bars at regular intervals, on which bars I hang loosely the material to be dried; or endless webbing may be employed, and the material laid on it. These bands or webbings move at a slow but uniform rate from the coldest to the hottest box or cylinder, which should be maintained at a temperature varying from 190 to 200 degrees. By this arrangement the necessary drying is gradually but thoroughly effected, the box or cylinder most distant from the inlet pipe being of lower temperature than the one in connexion with the boiler or steam producing apparatus, while each intermediate box or cylinder also gradually varies in its temperature. On passing from the last box or cylinder, the material may be carried through revolving brushes, which assist in removing the dust of the vegetable matter.

Having described the nature of my invention, and the manner of carrying the same into practical effect, I wish it to be understood that I do not confine myself to the precise arrangement of the details hereinbefore described, as the same may be varied without departing from the invention; but what I claim and desire to secure under the hereinbefore in part recited letters patent, is,—

Firstly, the process or processes for protecting the animal fibre from the injurious action of the solvents used for destroying the vegetable matter in mixed textile fabrics or mixed wool, as hereinbefore described.

Secondly, the arrangement of the apparatus for conveying the fibrous materials through the chemical solutions, and for pressing and drying them, as hereinbefore described.

Thirdly, the arrangement of the apparatus for finally

drying the fibrous material and cleansing it from the dust of the refuse vegetable matter, as hereinbefore described.—In witness, &c.

ALFRED LODWICK NEWMAN.

Specification of the Patent granted to ALFRED FORD, *of Chelsea, in the County of Middlesex, Gentleman, for Improvements in Dissolving Vulcanized India-rubber for Waterproofing and like Purposes.*—Dated September 20, 1856.

To all to whom these presents shall come, &c., &c.—My said improvements refer to a mode of treating vulcanized india-rubber with certain solvents in distillatory vessels heated by steam, hot water, or other available means, and in recovering the solvents by distillation; such preparation of the material rendering it suitable for waterproofing and similar applications.

And for the better understanding of my said invention, I will now proceed to detail the particulars necessary for carrying the same into practical operation.

I take all kinds of vulcanized india-rubber, whether waste or otherwise, and reduce the same to small pieces, and afterwards soak them in oil of turpentine or naphtha spirit, either prepared according to my patent, bearing date the 15th day of September, 1855, or otherwise, until saturated therewith. The vulcanized india-rubber thus treated is then to be transferred to suitable boilers or like vessels fitted with still heads, and having steam or hot water jackets to heat such boilers or vessels; and they should also be supplied with any convenient rotatory stirrers to agitate the vulcanized india-rubber during the operation. After being heated and stirred therein for some time the vulcanized india-rubber becomes completely dissolved, and it is then only necessary to continue the process until a sufficiency of the oil of turpentine or naphtha spirit or other solvent has distilled over, and been recovered for after use. The dissolved vulcanized india-rubber is then ready to be drawn off, and applied by the usual methods for waterproofing and other like manufactures.

Having thus fully described my said invention, I desire it to be understood that as the vessels and the means of heating the same may be very variously modified, I do not restrict myself to any particular kind of heating or distillatory apparatus, only I recommend that when the vapourised solvent is not intended to be distilled over, that the boilers, pans, or other similar vessels, should have their covers supplied with safety pressure and vacuum valves; neither do I limit myself to any precise quality or articles of which vulcanized india-rubber forms the whole or part, provided the nature of the same has not been destroyed by carbonization or otherwise, so long as the principle of my said invention is substantially maintained;

And I do declare that what I claim as my invention is, namely,—

The peculiar process of dissolving waste or other vulcanized india-rubber in volatile solvents in suitably heated distillatory or closed vessels, and the application of the dissolved material, as described.—In witness, &c.

Alfred Ford.

Specification of the Patent granted to Samuel Calley, *of Brixham, in the County of Devon, Shipowner, for Improved Composition and Compositions for Coating or Covering Surfaces, particularly the Bottoms of Ships and Vessels.*—Dated September 25, 1856.

To all to whom these presents shall come, &c., &c.—

I. The nature of this invention, as hath been before described in the provisional specification left and recorded on application for the said letters patent, consists in the improved composition and compositions for the above purposes, composed of some or all of the following materials, viz.:—Ferruginous substances mixed with a paint vehicle, or volatile spirit, and bituminous or tarry substances, which being properly mixed together form a mass of sufficient fluidity that the bottoms and sides of ships and vessels (and other surfaces) can be payed or painted over so as to protect them from the adhesion of weed, barnacles, and so forth.

II. Having thus described the nature of the said inven-

tion, I will now describe in what manner the same is to be performed, as I consider preferable, as follows:—

I take ferruginous substances, such as ferruginous ochres or oxides of iron, for instance, ochres from iron ore washings, dried, powdered, and sifted fine, and to this I add coal tar. The above-named substances I mix with a paint vehicle, or volatile spirit, or both, as turpentine and naphtha, or turpentine or naphtha by preference, and form a paste, the consistence of which paste is afterwards further reduced by the addition of more turpentine, &c., so as to give the mass the same degree of fluidity as ordinary oil paints, and I then pay over the surfaces to be treated with brushes, as in ordinary house painting. The proportions which I have found to answer to form the paste above mentioned are, 7 lbs. weight avoirdupois of turpentine, or naphtha, to 2 lbs. weight avoirdupois of coal tar, and about 15 lbs. weight avoirdupois of ochre from iron ore washings, or similarly ferruginous ochres, and by using every additional 4 lbs. weight of coal tar to the 7 lbs. weight of turpentine, &c., about 5 lbs. extra weight of ochre from iron ore washings, or similarly ferruginous ochres are required, as thus:—

	lbs.	lbs.	lbs.	lbs.	lbs.	
Turpentine or naphtha or turpentine and naphtha	7	7	7	7	7	and so on.
Coal tar	2	6	10	14	18	
Ochres from iron ore washings, or ochres of similarly ferruginous qualities . .	15	20	25	30	35	

These are about the proportions for hand grinding, but for power grinding more ochre could be used, as the substances could be ground drier.

As I find that the different parts of the globe and different climates that vessels trade in render it necessary to vary the character of the compositions, I purpose, when it is required, to use still more effectual means to prevent the adhesion of seaweed, barnacles, and so forth; to make such a chemical mixture of creosote and coal tar as that it shall have considerably more effective strength (say two-thirds more) as a bituminous or tarry substance than the proportion of coal tar above mentioned, for which I substitute it in making the above composition.

Also, in order to render the composition more effective

for the objects proposed, ammonia (such as is produced in the manufacture of coal tar) might be introduced to such an extent as to insure the composition maintaining its properties.

Sulphur, or sulphuric or sulphurous acid may likewise be added (with or without ammonia) to the turpentine or coal tar, or both, with the view to ensure the composition maintaining its properties in hot climates, &c.

III. Having now particularly described the nature of the said invention, and in what manner the same is to be performed, I hereby declare that I do not claim the use of the matters or things hereinbefore mentioned except as constituent portions of the composition and compositions, the nature and character whereof is set forth in the outset (marked I.) of this my specification thereof.—In witness, &c.

SAMUEL CALLEY.

Specification of the Patent granted to MATTHEW HICKSON, *of Salford, near Manchester, in the County of Lancaster, Gentleman, for Improvements in Waterproofing certain Woven Fabrics.*—Dated September 29, 1856.

To all to whom these presents shall come, &c., &c.—I dissolve the best refined white wax by heat and mix it with turpentine to a proper consistency for use in about the following proportions:—

To one gallon of turpentine I add about two ounces of wax, the wax being melted in any convenient vessel. I mix it with the turpentine whilst hot, and then put the said mixture into an ordinary silk finishing machine, trough, or other suitable vessel, and if the goods to be operated upon are to be fancy, I pass them through the liquid and then over a fire on to a roller; but if they are to be plain, I pass them over a fire, then over and under cylinders and on to a roller. This mixture and process is peculiarly applicable to single goods of light texture, as silk or satin, moiré antique, alpaca, light cotton goods, or fabrics made of a combination of silk and cotton, or other woven single fabrics without coating. They are also applicable to some kinds of made-up goods, as mantles,

umbrellas and parasols, cloth boots, and other similar articles requiring to be made waterproof and rendered durable.

Having thus described the nature of my said invention, and the manner in which the same is to be performed, I desire it to be distinctly understood that I do not confine myself to the exact proportions of the said materials, nor to any particular process of applying the same to goods or fabrics;—

But I claim as of my invention or discovery, and which, to the best of my knowledge and belief, has not been hitherto used within the realm, the use of turpentine and wax, in any suitable proportions, as a mixture for waterproofing, improving, and rendering mere durable woven fabrics and other goods without coating, however the same may be applied.—In witness, &c.

MATTHEW HICKSON.

Specification of the Patent granted to JAMES TIMMINS CHANCE, *of Birmingham, for Improvements in Furnaces used for Flattening Glass.*—Dated February 1, 1856.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—This invention has for its object improvements in furnaces used for flattening glass. For this purpose the beds (generally stone) on which the glass is flattened and cooled are placed each on a frame consisting of two parallel bars or rails connected together. These bars or rails rest on and are carried by the upper surfaces of rollers, which roll or move on two parallel fixed rails; the rollers for each bed are kept correctly in position, in respect to each other, by a frame and axles, and they are kept correctly on the fixed rails on which they roll or move by flanches or grooves to the peripheries of the rollers, or to the rails on which the rollers move.

Having thus stated the nature of my invention, I will proceed more fully to describe the manner of performing the same.

Description of the Drawing.

Heretofore wheels have been used for carrying the beds

of such furnaces (generally of stone), and it has been found that their diameters cannot be diminished below a certain size, say about eighteen inches diameter, without great inconvenience, by reason of the difficulty in overcoming the friction at the axles when the workman has to push or pull the carriages. I have ascertained that it is important to diminish the space which the wheels and the framework occupy, in order to economize the quantity of fuel required for producing a given degree of heat in the flattening furnace. Now, I have discovered that by the employment of rollers in place of wheels, as herein explained, the desired object may be accomplished without causing any inconvenience in moving the carriages. In the case of wheels, the whole weight of the bed and framework rests on the axles, whereas with rollers, the only weight which is borne by the axles is that of a light frame, which is used (as is hereinafter described) to keep the rollers in their proper position. I find that the diameter of the rollers need not exceed six inches, and may be still less if desired.

Fig. A, shows the flattening or cooling bed of a furnace, resting on two bars or rails, *a*, *a*, which rest on and are carried by the upper surfaces of the rollers, *r*, *r*, (having flanches,) and they roll on fixed parallel rails, *b*, *b*.

Figs. B, C, are a plan and end view respectively of the same arrangement. The rollers are kept in their correct positions by axles, *c*, *c*, and by a frame, *f*, *f*, resting upon them with suitable bearings. The proportion between the lengths of the flattening or cooling bed, and that of the rolling framework which carries it, and also the distance between the rollers lengthways, depend upon the distance to be traversed to-and-fro and the length of the beds themselves. It is perhaps unnecessary to observe, what will be self-evident to a mechanic, that the frame which is carried travels twice as fast as the framework of rollers which carry it, each revolution of these rollers causing the bed resting upon them to advance through a distance equal to twice the circumference of the rollers.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim is, the arranging the beds of furnaces for flattening glass in combination with rollers.—In witness, &c.

JAMES TIMMINS CHANCE.

Specification of the Patent granted to JOHN THOMAS WAY, *of Welbeck-street, in the County of Middlesex, for Improvements in Obtaining Light by Electricity.*—Dated October 29, 1856.

To all to whom these presents shall come, &c., &c.—Heretofore in obtaining light by means of electricity, electrodes of charcoal have usually been employed, and motion has commonly been given to such electrodes by clockwork or otherwise, so as constantly to change their acting points, but even with this precaution it has been very difficult to obtain a constant light in consequence of the want of uniformity in the electrodes.

Now this invention consists in the use, for one of the electrodes, of a substance such as mercury, which is caused to flow through an orifice or orifices on to a point or points of steel or other material. The mercury is in connexion with one of the poles of the battery, and the points are in connexion with the other pole of the battery, and they are so arranged that the distance between them and the orifices from which the mercury escapes can be adjusted so as to bring the points to the level at which the streams of mercury break into drops. In place of using points of steel or other material for the lower electrode, a regulated surface of mercury may be employed if desired, and the apparatus may be surrounded by a glass to prevent the escape of mercurial fumes, means also may be provided for raising the mercury from the lower receiver, into which it falls from the orifices, to the upper receiver or cistern which supplies the jets.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

I use a cistern of iron, slate, or other suitable material, from which the mercury is led by a pipe with a stop cock to a jet, with as small an orifice as I can conveniently make, from which by its own weight the mercury will flow in a constant stream. I find a height of from two to four feet to give a suitable pressure, but I do not confine myself to a particular pressure. It is obvious also that the jet or jets may be thrown upwards, or in any other direction that may be desirable, but I prefer that it should

descend from the orifice by gravity. The necessary pressure may also be obtained by mechanical means.

When a small power only is employed, the mercury may descend on to a point of steel, platinum, charcoal, or other conductor in connexion with one pole of the battery, the mercury itself being connected with the other pole; and it is important that the second electrode, or one of the electrodes, should be capable of ready adjustment, to insure its being at the point where the stream of mercury breaks, in order that there may be a space between the stream and the second electrode. When the electric power is great, I find that a point electrode is liable to be destroyed, and in such cases I employ a small cup of mercury made of infusible material, such as fire clay or other matter, so arranged that the mercury therein shall be in connexion with one pole of the battery; and I find that it is desirable that the mercury should flow off only on one side from the small cup, for which reason I make the cup cylindrical and about half an inch diameter, with the upper edge higher on one side than the other, so that the edge is formed to an inclination or angle of forty-five degrees. The use of a small cup of mercury for the second electrode is important, as, on the one hand, it does not materially interfere with the light passing downwards, and at the same time the quantity of mercury subject to the heat is small as compared with the quantity which would be present if the mass of mercury formed the second electrode.

The mercury flows away by a pipe from below the small cup into any convenient receptacle, from which it may be returned by hand, by a pump, or other means to the upper cistern.

Finally, a glass is used to retain the fumes of mercury, the glass is cemented into the two cast iron cylinders which form the upper and lower parts of the apparatus; this glass is to be as infusible as may be, and its size may vary from an inch in diameter to two inches or more, according to the size of the light to be produced. Instead of being a cylinder, the glass may be fixed in segments in a frame of metal, but in that case means must be taken to isolate one or other of the electrodes.

Whether a metal or other conducting point, or a cup of mercury be used, it is essential that means should be employed to adjust the distance between the two electrodes.

For this purpose a screw, or rack and pinion, or other equivalent mechanism is to be used, in combination with one or other of the electrodes, in order that the distance apart of the electrodes may be regulated thereby, and that they may be retained at a distance apart corresponding with the breaking point of the stream of mercury.

I would remark that I am aware that it is not new to employ a stream of mercury as an electrode in apparatus for obtaining light by electricity. I do not, therefore, claim the same, neither do I claim the adjusting of an electrode by a screw or other mechanical apparatus, when separately considered.

But what I claim is,

The use of a flowing electrode of mercury in combination with apparatus for regulating the distance apart of the two electrodes; and I also claim the combination of a small overflowing cup, or regulated surface of mercury, as a second electrode, with a flowing electrode of mercury, in apparatus for obtaining light by electricity.—In witness, &c.

John Thomas Way.

Specification of the Patent granted to Thomas Roberts *and* John Dale, *both of Manchester, in the County of Lancaster, Manufacturing Chemists, and* John Daniell Pritchard, *of Warrington, in the said County, Chemist, for Improvements in Obtaining and Purifying Oxalate of Soda, which Improvements are also Applicable to the Manufacture of Oxalic Acid.*—Dated November 21, 1856.

To all to whom these presents shall come, &c., &c.—Before describing our invention it is necessary to state that it has long been known that the oxalate of potash can be produced by submitting woody fibre, and other organic substances, to the action of caustic potash at certain temperatures; and it has also been stated that the same result can be obtained by employing caustic soda in the place of caustic potash. In practice, however, we find the amount of oxalate produced by the action of caustic soda alone to be so small as to be entirely useless for any purposes of manufacture, whilst the expense attending the use of caustic potash renders the process unremunerative.

Now our invention consists in submitting woody fibre, or other organic substances, to the combined action of caustic soda and caustic potash, at a temperature of 350 degrees to 400 degrees Fahrenheit, whereby oxalate of soda in considerable amount is obtained mixed with carbonates of soda and potash, as also with a small quantity of these alkalies in the caustic state. We purify the crude oxalate of soda thus obtained from the caustic and carbonated alkalies used, which is mixed by the process hereinafter described; but it is necessary first to state that the ordinary method of separating two soluble salts by a process of solution and crystallization is inapplicable to this mixture, owing to the slight solubility of oxalate of soda and the exceedingly minute state of division in which this latter salt exists, when obtained by the ordinary process of crystallization, its complete separation being thus rendered impossible.

Now our improved process for purifying the crude salt consists in placing the mixture of oxalate of soda and caustic and carbonated alkalies, when perfectly cold, in tanks, and submitting it to the action of cold or warm water; and this we prefer doing by the use of a series of tanks, whereby the partially saturated solution in the first tank shall flow over the salt in the second, and so on, according to the method known as continuous lixiviation, as adopted in soda ash making.

In this way potash and other foreign substances are dissolved away from the oxalate of soda, which is thus obtained in a pure or nearly pure state, suitable for the manufacture of oxalic acid. By evaporating the wash water the potash is recovered, so that it may be again used.

And in order that our said invention may be most fully understood and readily carried into effect, we will proceed to describe the method in which we prefer to conduct the manufacture.

We take a mixture of two equivalents of potash and three equivalents of soda, and after having causticised or partially causticised these alkalies, we proceed to concentrate by evaporation until the same shall have reached a specific gravity of 1·350, but this point of concentration is not material, as these alkalies may be used either continuously above or below this point.

Woody fibre or other organic substance (but the material we use is sawdust) is now mixed with the alkaline mixture

of soda and potash previously described; the proportions we use being for every 100 parts of real alkali contained in the concentrated solution, thirty to forty parts of sawdust or woody fibre; the sawdust is spread upon plates of iron, and the alkali in the proportion described is gradually and completely mixed with it, and care is taken to spread the mixture evenly over the plate by the use of an iron rake, or by other means.

So soon as this mixture shall have been effected the temperature is raised by heated flues underneath the plates, and this heating of the mixture is continued during a period of from four to six hours or thereabouts. The first effect of the application of heat is the evaporation of the water contained in the mixture, and after the expulsion of the water the heat is continued with constant stirring of the mixture until it shall have reached a temperature of from 350 to 400 degrees of Fahrenheit, at which temperature it must be carefully maintained with constant stirring, until on inspection the woody fibre or sawdust is found to have disappeared; this having been effected, the operation is complete, and the material produced will be found to contain a considerable amount of oxalate of soda, combined or mixed with other products. This material we call crude oxalate. To purify the crude oxalate we place it when perfectly cold in iron tanks or other vessels, and submit it to the action of cold or warm water, and this we prefer doing by the use of a series of tanks so arranged that the partially saturated solution from the first tank, or that containing the already partially washed salt into the second, or that containing a salt more recently subjected to the washing process, and so on according to the method known as continuous lixiviation, as adopted in soda ash making. The effusion of cold water is continued on the oxalate until the liquor flowing from the vessel shall mark a specific gravity of 1·030; there will then remain in the tank in almost a state of purity, the oxalate of soda contained in the crude oxalate, and which oxalate may afterwards be converted into binoxalate of soda, or used for the manufacture of oxalic acid.—In witness, &c.

THOMAS ROBERTS.
JOHN DALE.
JOHN DANIELL PRITCHARD.

Specification of the Patent granted to WILLIAM MORGAN, *of 48, Gloucester-terrace, Hyde-park, in the County of Middlesex, for An Improvement in Heating parts of Cylinders and other Hollow Bodies of Iron to a Welding Heat.*—Dated November 20, 1856.

To all to whom these presents shall come, &c., &c.—This invention has for its object an improvement in heating parts of cylinders and other hollow bodies of iron to a welding heat, and the invention consists in employing flames of gas by suitable burners, interior and exterior of such bodies, near the localities or parts where welds or joints are to be produced.

Having thus stated the nature of my said invention, I will proceed more fully to describe the manner of performing the same.

The cylinders or hollow bodies of iron are first made or put together in the form of rings, or it may be coils, so that the butting surfaces of the rings or of the coils come correctly together. And in order to ensure good welds in every part of the butting surfaces it is desirable that they should be made true by planing or otherwise before bringing them together, and that the surfaces should be kept clean. The butting surfaces which are to be welded together may be plain, but I prefer them to be alternately convex and concave, so that they may fit into each other, as was described in the specification of a former patent granted to me and bearing date, the 14th day of August, 1856.

The peculiarity of the present invention consists in the application of the heat of the flames of gas by suitable burners interior and exterior of the cylinders or hollow bodies, to be welded in place of heating, such cylinders or hollow bodies in a smith's fire or in a reverberatory furnace heated by fire.

The object of my invention is to apply as pure a heating flame as may be, and to avoid the presence of dust and other impurities which are necessarily consequent on the employment of smith's fires and reverberatory furnaces, such as have heretofore been used. The parts of a cylinder or hollow body (about to be welded) are to be held clamped together previously to commencing to heat the parts to

be welded, and the weld is to be obtained when at a proper heat by pressure in the direction of the axis of the cylinder or body to be welded, as was described in the specification of my said former patent. The gas I prefer is hydrogen or carburetted hydrogen, as free from sulphur as possible, and I burn such gas in jets from suitable ring burners applied inside and outside of the cylinder or body to be heated, and I believe that such burners may be most advantageously made of refractory fire-clay. On the inside of the cylinder a burner (of somewhat less diameter than the interior of the cylinder to be welded) is used, having numerous small orifices for the passage of gas and air, supplied to the burner by separate pipes, each of which pipes communicate with a separate chamber or compartment within the burner. Each of the orifices of the burner is formed in such manner that from the outer surface of the burner it branches into two inclined passages, one branch opening into and communicating with the chamber in the burner with which the gas supply pipe is connected, the other branch being connected with the other chamber in the burner, which is supplied with the atmospheric air, by which means each orifice of the burner will have (when in use) a compound jet passing out there from, but the gas and the air coming from each orifice of the burner will not combine till they are about to escape through the orifice of the burner. The heat of such compound jets will when ignited be very great, as is well understood. The external burner is constructed of a ring form, somewhat of larger diameter than the exterior of the cylinder to be heated, and the orifices are formed on the inner surface of such ring burner, and they are constructed similarly to those which have been before described for burning gas. The gas and the air supplied to the burners are to be retained at a like pressure to prevent them from mixing in either chamber of the burner and causing explosion. In heating the outside of a cylinder it is desirable that there should be an enclosure of fire brick to enclose the cylinder and the exterior burner, to prevent the escape of heat. In place of using the forms of burners above described (which are intended to be employed in heating only a comparatively short length of a cylinder or hollow body near where a weld is to be effected), a suitable chamber burner, or gas furnace, made of or lined with fire brick, may be used in which the whole

mass of iron may be heated at one time by burning gas therein with atmospheric air as is well understood. In whatever mode the heat of gas is used, provision is to be made for introducing or applying pressure in the direction of the axis or length of the cylinder or hollow body, as described in my said former specification.

I would here state that I make no claim to the construction of burners such as above described suitable for burning gas, my invention consisting in the application of the heat of gas when welding cylinders, or other hollow bodies, as herein explained.

And I would also state that I do not confine myself to the details herein explained, so long as the heat of gas is employed in raising the butting surfaces of the parts of cylinders, or other hollow bodies of iron, to a welding heat, in order that the same may be welded by pressure applied in the line of the axis of such cylinders or hollow bodies.—In witness, &c.

William Morgan.

Specification of the Patent granted to Francis Cook Matthews, *of Great Driffield, in the County of York, Manufacturing and Agricultural Chemist, for Improvements in Preparing Manure.*—Dated October 31, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in preparing the substance known as Columbian guano, or an impure pyrophosphate of lime, by treating the same with sulphuric or muriatic acid, so as to render it suitable for use as a manure, either alone or mixed with other substances.

Columbian guano is a substance recently imported in considerable quantities from abroad, and is, as before mentioned, an impure pyrophosphate of lime. Now pyrophosphate of lime contains for a given proportion of phosphoric acid a much smaller proportion of lime than that contained in the phosphate of lime, of bones, coprolites, and apatites, and I am well aware that these substances have frequently been treated with acid to render them suitable for use as manure.

When preparing Columbian guano according to my invention, I grind it to powder, and then mix with it sulphuric or muriatic acid, but I use sulphuric acid by preference; and I find it necessary to employ about one-half the quantity of acid which it would be necessary to employ in treating a coprolite or similar substance containing the same per centage of phosphoric acid.

The mixing operation is conducted in a manner similar to that employed when sulphuric acid is mixed with a coprolite as heretofore.

The manure prepared from Columbian guano, as above described, is thus produced with a much less expenditure of acid than the manure prepared from coprolites and similar substances, which manure is also much superior, as it contains a smaller proportion of sulphate of lime, a substance which is valueless, or nearly so, both commercially and as a manure.—In witness, &c.

FRANCIS COOK MATTHEWS.

Specification of the Patent granted to WILLIAM JACOBS, *of Albert-road, Globe-fields, Mile-end, in the County of Middlesex, for an improved Composition for Bedding and Rendering Bricks in Furnaces.*—Dated November 21, 1856.

To all to whom these presents shall come, &c., &c.—This invention consists in the use of an improved composition for bedding and rendering bricks in furnaces.

The composition consists of the following materials:—

One yard of loam, by preference of that description which is found in Kent, and known as black foot loam.

Three yards of pulverized chalk flints, or for this description of sand, other sharp sand, such as river or road sand, may be substituted.

And one yard of hydraulic or stone lime, which has been previously slacked by exposure in the air.

The materials above-mentioned produce by themselves an excellent composition for bedding and rendering bricks in furnaces, but I have sometimes added to them the following other substances, viz.:—

One half-yard of ground malm bricks, and
One third of a yard of breeze or fire ashes.

In place of the lime mentioned as forming part of the composition, I sometimes substitute an equal quantity of Portland cement, or a part only of the lime may be replaced by cement, if it is preferred.

The materials are to be mixed with water to the consistency of mortar, and in the composition so prepared the bricks are to be bedded in the ordinary manner, and they may afterwards be rendered with the same composition.

It will be found that my improved composition will adhere to the bricks of the furnace with much greater tenacity than fire clay, when exposed to a high heat, and it will not, as the fire clay does, scale off and fall out of th joints.—In witness, &c.

WILLIAM JACOBS.

SCIENTIFIC MISCELLANEA.

DYEING.

M. FR. KUHLMANN, having remarked that when eggs were dyed, some of them took the colours better than others, and that this fixation of the colour took place without any mordant, was led to suppose that, in these cases, the fixation was due not to the calcareous salt of which the egg-shell is formed, but to an azotized coating upon its surface. This supposition was verified by experiment. As the coating of the egg-shell is very analogous to albumen, this latter substance, coagulated by heat, was tried separately in the baths of Brazil wool, &c., and its absorbing power thus shown. M. Kuhlmann then tried the use of this substance, for the purpose of increasing the absorbing power of different tissues; he obtained very favourable results with cotton, less distinct with silk, scarcely perceptible with wool; these trials were made with Brazil wood, madder, and Campeachy wood. After albumen, he tried with the same success milk and caseum, which may be coagulated on the surface of the tissues by means of an acid. Milk, especially alone or in connexion with mordants, gave the cotton very full colours. He experimented also upon

gelatine coagulated by tannin, and obtained results, although feeble, without mordants. He also showed that albumen may serve as a medium for precipitating upon stuffs, metallic oxides, with which it forms insoluble compounds; in dyeing, stuffs impregnated with these compounds absorb colours with more ease than if they had been prepared either with albumen, or with the same metallic salts alone. Analogous results were obtained with tannin-gelatine.—*L'Institut*, 26th November.

ACTION OF TANNIN UPON SKIN.

THE investigations which M. Payen laid before the Academy of Sciences (Paris), are only the prelude to an attempt to get at, if it be possible, the knowledge of the phenomena which are going on during the operation of tanning, and to establish a theory of this operation, still so obscure to the chemist. In this first part he has endeavoured only to examine thoroughly and show the generality of a fact which he had observed several years ago. This fact is, that there exist in the skin two portions which present different properties when they have undergone the action of tannin. One of these is easily disaggregated, soluble in ammonia water; the other preserves its fibrous texture, and resists the action of the re-agent, although frequently renewed. The saturation of the skin by the tannin takes place long before the time practically required for good tanning; and requires for the two parts much less tannin than gelatine. The compound formed with the tannin, by the less cohesive parts of the skin, when it has been dissolved in ammonia, is changed in dissolving; it undergoes, besides, a considerable loss of nitrogen during its evaporation to dryness. The effects of long-continued tanning cause the gradual solution of the less cohesive portions united with the tannin, and consequently a relative increase of the quantity of resisting fibrous material. The product, in this case, must therefore be both more pliable and more tenacious. The friable soluble portion which remains in the tanned leather is unstable; in dissolving, it may withdraw considerable quantities of the azotized substance; and it is thus, perhaps, that the less cohesive part of the skin is removed during the long operations of

tanning. These are, in substance, the remarks which result from the observations and analyses reported in detail by M. Payen. The author proposes to examine successively all the operations of tanning, and to study separately the effects produced by lime, soda, by ammonia, the formation of which is determined by the foregoing bases, by dilute sulphuric and lactic acids, &c.—*L'Institut*, 26th November.

PATENTS SEALED TO MAY 22, 1857.

April 28, 1857.

2531. Samuel Russell, of Sheffield, for the manufacture of tea-pot handles, knobs, door plates, finger plates, razor scales, and knife handles.—Dated October 28, 1856.

2538. Louis Adolphe Faure, of Paris, and of Essex-street, Strand, London, for an improved pump.—Dated October 29, 1856.

2540. Thomas John, of Paris, for a new electric telegraph apparatus for writing.—Dated October 29, 1856.

2547. John Thomas Way, of Welbeck-street, Middlesex, for obtaining light by electricity.—Dated October 29, 1856.

2550. William May, of London, for steam-engine indicators.—Dated October 30, 1856.—(A communication.)

2557. John Lawson, of Glasgow, for the manufacture of pile and other fabrics.—Dated October 31, 1856.

2562. Henry Hutton, of Reading, for improvements in lubricators.—Dated October 31, 1856.

2564. Joseph Browne, of Liverpool, for the construction and working of ships' windlasses and capstans, part of which improvements are also applicable for steering ships and other vessels.—Dated November 1, 1856.

2568. John Parbery, of Northampton, for horse-collars.—Dated November 1, 1856.

2572. Josiah Stone, of New Cross, Kent, for the construction of force-pumps.—Dated November 1, 1856.

2615. James Webster, of Birmingham, for a new or improved instrument or apparatus for transmitting hydrostatic and pneumatic pressure, which said instrument or apparatus is applicable to pressure gauges, safety valves, thermometers, pumps, and other like machines.—Dated November 6, 1856.

2681. The Hon. William Erskine Cochrane, of Regent's Park, for the permanent way of railways.—Dated November 14, 1856.

2683. Joseph Hacking, of Bury, Lancashire, for machinery for dressing, polishing, and finishing threads and yarns.—Dated November 14, 1856.

2687. Richard Emery, of Westminster, for the construction of axles and boxes of carriages for common roads.—Dated November 14, 1856.

2691. John Sutherland, of Paddington, for an improved railway break.—Dated November 14, 1856.

2705. GEORGE DAVIES, of Serle-street, Lincoln's-inn, for an improved paper suitable for the filtration of liquids, the dressing of wounds, and for the manufacture of envelopes, bags, bands, and for other similar purposes.—Dated November 15, 1856.—(A communication.)

2717. ESTEVES BLANCHON, of Blois, France, for machinery and apparatus for marking and boring leather and other similar substances, for making and cutting screwed pins, and for uniting leather and other similar materials.—Dated November 17, 1856.—(A communication.)

2721. SAMUEL CUNLIFFE LISTER, of Manningham, near Bradford, for spinning.—Dated November 18, 1856.

2743. JAMES MONTGOMERY GILBERT, of Manchester, for certain machines for etching or engraving.—Dated November 20, 1856.

2753. LOUIS DARTOIS, of Paris, and of South-street, Finsbury, London, for a machine for the cleansing of textile and fibrous substances.—Dated November 21, 1856.

2767. THOMAS ROBERTS and JOHN DALE, of Manchester, and JOHN DANIELL PRITCHARD, of Warrington, for obtaining and purifying oxalate of soda, which improvements are also applicable to the manufacture of oxalic acid.—Dated November 21, 1856.

2805. ALFRED VINCENT NEWTON, of Chancery-lane, for coating iron bolts, bars, sheets, spikes, nails, and other articles of iron, with metallic alloys for the prevention of rusting or oxydation.—Dated November 26, 1856.

2817. AUGUSTE CELLIER, of Paris, and of South-street, Finsbury, London, for an improved mucilage applicable to the sizing and printing of textile materials.—Dated November 28, 1856.

2829. JOHN BROWN, of Liverpool, for the construction of the lower masts of ships.—Dated November 29, 1856.

2935. MICHAEL BURKE, of Liverpool, for the construction of anchors.—Dated December 11, 1856.

3021. ROBERT GIBSON, of Hull, for an improved self-acting apparatus for signalling on railways.—Dated December 22, 1856.

99. ARNOLD GOODWIN, of Guildford-street, London, for fixing the tubular flues of steam boilers.—Dated January 12, 1857.

279. ISAAC HOLDEN, of St. Denis, near Paris, for combing wool and other fibres.—Dated January 30, 1857.

281. ISAAC HOLDEN, of St. Denis, near Paris, for carding wool and other fibres.—Dated January 30, 1857.

319. JAMES HAMSHER, of Elizabeth-street South, Pimlico, for the manufacture of blacking for polishing, softening, and preserving boots and shoes and other leathern articles.—Dated February 4, 1857.

May 1, 1857.

2588. JOSEPH JESSOP, of Bradford, for machinery for washing, wringing, and mangling.—Dated November 4, 1856.

411. DAVID BAKER, of the Gisbre Alum Works, Yorkshire, for the manufacture of compounds of alumina and of magnesia.—Dated February 12, 1857.

529. WILLIAM EDWARD NEWTON, of Chancery-lane, for a furnace for locomotive and other boilers.—Dated February 23, 1857.—(A communication.)

559. AUGUSTE GODET, of Bordeaux, for reefing sails.—Dated February 25, 1857.

571. Walter Macfarlane, of Glasgow, for moulding or manufacturing cast-iron pipes.—Dated February 26, 1857.

591. James Edward McConnell, of Wolverton, for railway-breaks.—Dated February 28, 1857.

647. Thomas Burstall, of Southall, Middlesex, for machinery for manufacturing bricks and tiles from clay alone, or mixed with other materials.—Dated March 5, 1857.

663. Rowland Mason Ordish, of Regent's Park, for suspension-bridges.—Dated March 7, 1857.

665. Josiah Parkes, of Great College-street, Westminster, for an apparatus for locomotive purposes.—Dated March 7, 1857.

May 5, 1857.

2592. Andre Jacques Isaac de Montenay du Minhy, of Blois, France, for screw hand-presses.—Dated November 5, 1856.—(A communication.)

2593. William Weild, of Manchester, for velvet or cut pile fabrics, and in looms or machinery used for weaving such velvet and other loop pile fabrics.—Dated November 5, 1856.

2610. George Henry Stevens, of Pimlico, and Robert Fitch, of South Lambeth, for locking and unlocking jars, bottles, and other vessels, and making such vessels air tight.—Dated November 6, 1856.

2611. Joseph La Cabra, of Albany-street, Middlesex, for improvements in the action of pianofortes.—Dated November 6, 1856.

2618. Frederic Chapman, of Piccadilly, Westminster, and Charles Bowyer, of Davies-street, Middlesex, for purifying and disinfecting intestines, and manufacturing gelatine therefrom.—Dated November 6, 1856.

2624. Amos Holt and Jabez Bentley, of East Ardsley, near Wakefield, for machinery for weaving stuff and other goods.—Dated November 7, 1856.

2626. James Dickinson, of Blackburn, for machinery or apparatus used in the preparation of cotton or other fibrous substances for spinning.—Dated November 8, 1856.

2630. William Gossage, of Widnes, Lancashire, for the manufacture of carbonates of zinc, of iron, and of manganese, and in the useful application of such carbonates.—Dated November 8, 1856.

2631. Charles Vaughan, William James Vaughan, and Richard Vaughan, of Birmingham, for a strap or band for working stamps, raising weights, and transmitting power generally.—Dated November 8, 1856.

2637. Richard Archibald Brooman, of Fleet-street, London, for preserving provisions.—Dated November 8, 1856.—(A communication.)

2644. Peter Gaskell, of Sculcoates, Kingston-upon-Hull, for the admission of steam into the cylinders of steam engines by an equilibrium valve.—Dated November 10, 1856.

2658. John Patterson, of Beverley, for apparatus for churning, which apparatus is also applicable to the washing of roots and other substances.—Dated November 12, 1856.

2684. Thomas Beatt Sharp and Joseph Anthony Collet, of Manchester, for locomotive steam engines.—Dated November 14, 1856.

2686. Richard Emery, of King-street, St. James's-square, for

springs for carriages and other vehicles.—Dated November 14, 1856.

2696. Archibald Reid, of Sidmouth-street, Regent-square, and Charles O'Neil, of Golden-square, for treating metallic ores to obtain copper.—Dated November 14, 1856.

2709. John Drew, of Back-hill, Middlesex, for library tables or desks.—Dated November 15, 1856.

2738. Alfred Watson and Alfred Hamlyn Williams, of Cornhill, for a cap or top for scent bottles.—Dated November 19, 1856.

2808. Peter Armand le Comte de Fontainemoreau, of Paris, and of South-street, Finsbury, London, for improved weighing apparatus.—Dated November 27, 1856.—(A communication.)

2894. William Hadfield Bowers, of Manchester, for apparatus to be used for the purposes of distillation.—Dated December 6, 1856.

2898. John Longbottom, of Leeds, for generating, surcharging, or superheating steam.—Dated December 6, 1856.

2914. John Browning, of the Minories, London, for stereoscopes. —Dated December 9, 1856.

2994. Vincent Louis Cazimir Renou, of Jersey, for the manufacture of spirit when rice is used.—Dated December 17, 1856.

278. Isaac Holden, of St. Denis, near Paris, for washing and drying wool and other fibres, part of which improvements is applicable when connecting together lengths of leather for other purposes.—Dated January 30, 1857.

280. Isaac Holden, of St. Denis, near Paris, for preparing and combing wool and other fibres.—Dated January 30, 1857.

474. Robert Best, of Birmingham, for an improvement or improvements in illumination.—Dated February 18, 1857.

487. James Crook, of Hoxton, for looms for weaving elastic and other fabrics.—Dated February 19, 1857.

548. William Wood, of Pontefract, Yorkshire, for machinery or apparatus used in the manufacture of carpets and other pile fabrics. —Dated February 25, 1857.

582. Alfred Vincent Newton, of Chancery-lane, for springs for railroad carriages and other uses.—Dated February 27, 1857.—(A communication.)

590. George Wilson, of Glasgow, for weaving.—Dated February 28, 1857.

604. Edwin Francis Jones, of Redcar, York, for the manufacturing of pig and bar iron.—Dated March 2, 1857.

624. William Edward Newton, of Chancery-lane, for improved means for preventing the forgery or imitation of bank notes, bills, certificates, cheques, bonds, deeds, and other like articles.—Dated March 3, 1857.—(A communication.)

696. Nathan Appleton Dyar, of Massachusetts, U. S. A., for a composition to be applied as a covering to the sides and roofs of buildings, and for various other purposes.—Dated March 9, 1857.

May 8, 1857.

2643. William Stones, of Greenhithe, Kent, for sizing paper.—Dated November 10, 1856.

2648. William Smith, of Salisbury-street, Adelphi, for machinery

for sewing cloth and other materials.—Dated November 11, 1856.—(A communication.)

2649. JOHN FELL JONES, of Birmingham, for the manufacture of rollers or cylinders for printing fabrics, and in machinery to be used in manufacturing the said rollers or cylinders.—Dated November 11, 1856.

2659. WILLIAM LUKYN, of Nottingham, for a buffer break for railway carriages or trucks attached to locomotive engines, whether one or more engines, for the conveyance of goods or passengers.—Dated November 12, 1856.

2660. GEORGE ISLINGTON BACHE, of Glasgow, for lamps and apparatus for affording or supplying artificial light.—Dated November 12, 1856.

2661. WILLIAM WEILD, of Manchester, for machinery for doubling, twisting, and winding yarns or threads on to bobbins or spools.—Dated November 12, 1856.

2675. ALEXANDER HUTTON, of Ardwick, near Manchester, for a warming apparatus applicable to railway and road carriages and other useful purposes.—Dated November 13, 1856.

2676. THOMAS STEPHEN HOLT, of Manchester, and EDWARD EARNSHAW and JAMES BARLOW, of Rochdale, for certain parts of steam engines, steam boilers, and apparatus connected therewith.—Dated November 13, 1856.

2698. JAMES GREAVES, of Gerrard-street, Soho, for ladies' side saddles.—Dated November 14, 1856.—(A communication.)

2713. ALEXANDRE MARIE JOSEPH EECKMAN, of Lille, France, for a mechanical bakery and cookery.—Dated November 17, 1856.

2719. JOHN WILSON, of West Bromwich, Stafford, for springs for railway and other carriages.—Dated November 18, 1856.

2752. RICHARD EATON, of Battersea, for apparatus for buffing on railways, and for other purposes.—Dated November 20, 1856.

2779. WILLIAM EDWARD NEWTON, of Chancery-lane, for railway carriages.—Dated November 22, 1856.—(A communication.)

2792. HENRY BRAGG, of Belfast, Ireland, for drying or extracting moisture from air, and in machinery or apparatus for starching, clearing, drying, stretching, and finishing fabrics.—Dated November 25, 1856.

2800. JOHN BROWN, of Bolton-le-Moors, and JOHN ADIN, of Manchester, for Jacquard machines.—Dated November 26, 1856.

2807. ASA LEES and DAVID SCHOFIELD, of Oldham, for self-acting mules for spinning and doubling.—Dated November 27, 1856.

2816. CAMILLE AUGUSTE TISSOT, of Paris, and of South-street, Finsbury, London, for the production of motive power, and in the apparatus connected therewith.—Dated November 28, 1856.

2842. GEORGE JULIUS VERTUE, of Northam, Southampton, for deodorizing sewage waters and sewage matter when lime is used.—Dated December 1, 1856.

2864. FREDERICK ALBERT GATTY, of Accrington, Lancashire, for the construction of filters or drainers.—Dated December 3, 1856.

3029. WILLIAM HENRY STRATTON, of Lambeth, for the fire doors of furnaces.—Dated December 22, 1856.

3086 WILLIAM RENWICK BOWDITCH, of Wakefield, for the manufacture of a compound to be used as a varnish for water colours, and as a carrier for water colours or paints.—Dated December 29, 1856.

186. Henry Medlock, of Great Marlborough-street, Westminster, for a method of purifying water.—Dated January 21, 1857.

256. Arthur Clark, of Southampton, for signal lamps.—Dated January 28, 1857.

290. Henry Whittles and Robert Schofield, of Rochdale, for the construction of the slide valves of steam engines, and in the mode of working the same for the better regulation of the vacuum in the cylinders thereof, economizing fuel, and for ensuring safety and steadiness of such machines whilst in action.—Dated January 31, 1857.

369. Charles Turner and Louis Watermann, of Liverpool, for improvements in or applicable to the class of hats made from straw, grass, palm-leaf, or other like materials.—Dated February 9, 1857.

453. Alexander Parkes, of Birmingham, for the manufacture of nails.—Dated February 16, 1857.

492. Peter Cato and Joseph Betteley, of Liverpool, for improvements in the masts, yards, and spars for ships or sailing vessels.—Dated February 19, 1857.

630. Rudolph Bodmer, of Thavies-inn, Holborn, for apparatus for steering ships.—Dated March 4, 1857.—(A communication.)

640. William Frederick Taylor Bradshaw, of Sheffield, for making palette, and other like knives.—Dated March 5, 1857.

697. Johannes Neuenschwander, of Kensington, for the process of preserving milk.—Dated March 10, 1857.

719. Thomas Horne, of Birmingham, for a method of ornamenting metallic bedsteads and washhand stands.—Dated March 13, 1857.

755. George Forsyth, of Maxwelltown, Kirkcudbright, for steam cooking apparatus.—Dated March 17, 1857.

761. James Murdoch, of Staple-inn, Middlesex, for a process for imitating the skins of animals upon fulled cloth.—Dated March 18, 1857.—(A communication.)

May 12, 1857.

2662. Joseph Eccles, of Blackburn, for machinery for making bricks, tiles, pipes, and other articles made of plastic materials.—Dated November 12, 1856.

2695. Christopher Binks, of London, for converting iron into steel, and in giving a coating of steel to iron.—Dated November 14, 1856.

2732. John Lord, of Rochdale, for an admixture or compound to be employed as a substitute for oil in the treatment of animal wool preparatory to "carding."—Dated November 19, 1856.

2750. Robert Brock Benson, of New York, U. S. A., for reefing sails.—Dated November 26, 1856.

2766. Charles Garton and James St. John Gage Parsons, of Bristol, for treating cane sugar, in order to fit it to be employed in brewing and distilling.—Dated November 21, 1856.

2806. Henry Eastman Palmer, of Stonehouse, Devon, for photographic apparatus.—Dated November 26, 1856.

2826. William Johnson, of Lincoln's-inn-fields, and of Glasgow, for improvements in projectiles.—Dated November 29, 1856.—(A communication.)

2968. George Littlewood, of London-wall, London, for printing geometric patterns.—Dated December 13, 1856.

118. William Edward Newton, of Chancery-lane, for rollers

employed for calendering, mangling, and other processes of analogous character.—Dated January 14, 1857.—(A communication.)

192. CARL CHRISTIAN ENGSTROM, of Stockholm, for the construction of projectiles for rifled guns and mortars.—Dated January 22, 1857.

314. GEORGE WHITE, of Laurence Pountney-lane, Cannon-street, London, for dyeing and printing textile fibres and fabrics.—Dated February 3, 1857.—(A communication.)

478. JOHN MOULE, of Seabright-place, Hackney-road, for apparatus to be used for burning pyrotechnic compositions, or preparations for producing artificial lights of various colours.—Dated February 18, 1857.

654. GEORGE TOMLINSON BOUSFIELD, of Brixton, for machinery for compressing clay and other materials applicable to the manufacture of bricks and other articles.—Dated March 5, 1857.—(A communication.)

735. WILLIAM PIDDING, of New Kent-road, Surrey, for machinery or apparatus for the manufacture of piled fabrics, whether plain or figured.—Dated March 16, 1857.

May 15, 1857.

2704. ANDREW BARCLAY, of Kilmarnock, Ayr, for the manufacture of iron.—Dated November 15, 1856.

2711. CHRISTOPHER BINKS, of London, for the manufacture of iron and steel.—Dated November 14, 1856.

2720. WILLIAM HEALY, of Dorset-street, Salisbury-square, for furnaces and boilers, and hot-water apparatus for heating purposes.—Dated November 18, 1856.

2724. SAMUEL DYER, of Bristol, for improved mechanism applicable to propelling ships and vessels; applicable also as power machinery for ships' purposes.—Dated November 18, 1856.

2735. THOMAS HINDLE, of Blackburn, for the manufacture of textile fabrics.—Dated November 19, 1856.

2745. PETER ARMAND LE COMTE DE FONTAINEMOREAU, of Paris, and of South-street, Finsbury, London, for apparatus for preparing carbonic acid gas, and impregnating liquids therewith.—Dated November 20, 1856.—(A communication.)

2795. JOHN PALMER, of Stockton-on-Tees, for an improved means of separating different kinds or qualities of seed or grain from each other.—Dated November 25, 1856.

2823. JOHN GEORGE TAYLOR, of Glasgow, for pencilcases.—Dated November 29, 1856.

2843. FRANCIS PEABODY, of St. James'-street, Westminster, for apparatus for obtaining motive power by the action of the wind.—Dated December 1, 1856.

2855. JOHN FOWLER, of Havering, Essex, for the manufacture of wire ropes.—Dated December 2, 1856.

2857. ROBERT DRYDEN, of Lambeth, and STEPHEN MILES, of Bermondsey, for the construction of cylinder printing presses.—Dated December 2, 1856.

2947. WILLIAM COLBORNE CAMBRIDGE, of Bristol, for an improved construction of portable railway.—Dated December 11, 1856.

3041. WILLIAM EDWARD NEWTON, of Chancery-lane, for improvements in meters for water and other liquids.—Dated December 23, 1856.—(A communication.)

167. Thomas Johnson, of Runcorn, Cheshire, for an improvement in purifying alkaline lees.—Dated January 20, 1857.

233. John Henry Johnson, of Lincoln's-inn-fields, and of Glasgow, for sewing machines.—Dated January 26, 1857.—(A communication.)

539. Joseph Betteley, of Liverpool, for machinery for lifting and working anchors, cables, and other weights on shipboard.—Dated February 24, 1857.

649. George Bower, of Saint Neots, Huntingdon, for apparatus for manufacturing gas.—Dated March 5, 1857.

773. William Reid, of Shattleston, Lanark, for safety apparatus for guarding the mouths of pits, excavations, and other openings.—Dated March 19, 1857.

833. Alfred Vincent Newton, of Chancery-lane, for an improved construction of water meter.—Dated March 25, 1857.—(A communication.)

May 19, 1857.

2736. George Watson, of Manchester, and Cornelius Satterthwaite, of Preston, for the manufacture of fire-lighters.—Dated November 19, 1856.

2739. Samuel Fox, of Deepcar, Sheffield, for machinery for drawing wire and tubes.—Dated November 19, 1856.

2741. Samuel Fox, of Deepcar, Sheffield, for heating steel wire and tubes, also ribs and stretchers of umbrellas and parasols, for hardening and in apparatus for straightening wire and tubes.—Dated November 19, 1856.

2757. John William Clare, of White-street, St. George-the-Martyr, for preventing, removing, consuming, and condensing smoke and noxious vapours, and in apparatus for those purposes.—Dated November 21, 1856.

2762. William Jacobs, of Albert-road, Globe-fields, Mile End, for a composition for bedding and rendering bricks in furnaces.—Dated November 21, 1856.

2763. Joseph Barrans, of New Cross, Surrey, for apparatus for applying oil or lubricating fluid to the axles of railway carriages and locomotive engines.—Dated November 21, 1856.

2765. Richard Archibald Brooman, of Fleet-street, for a method of and preparation for rendering textile and other like fabrics sanitary and disinfecting agents.—Dated November 21, 1856.—(A communication.)

2768. Alexander Clark, of Gate-street, Lincoln's-inn-fields, for the application and construction of revolving window shutters and blinds, and metal window sashes.—Dated November 21, 1856.

2771. Alexander Robert Terry, of Great George-street, Westminster, for sawing, splitting, cutting, and binding kindling wood.—Dated November 22, 1856.

2774. Joseph Wheeler, of Wootton-under-Edge, for a method of converting rotary into reciprocating motion, especially applicable to machinery for forcing plastic substances through moulds and dies.—Dated November 22, 1856.

2775. Richard Archibald Brooman, of Fleet-street, for the manufacture of artificial wines or beverages to be substituted for

wines, and in apparatus for aiding fermentation.—Dated November 22, 1856.—(A communication.)

2776. John Skirrow Wright, of Birmingham, for the manufacture of paper or papier maché and metal buttons.—Dated November 22, 1856.

2787. Henry Brickley, of Stratton, near Cirencester, for mills for grinding.—Dated November 24, 1856.

2852. Richard Archibald Brooman, of Fleet-street, for a chemical composition or agent to be employed in the dyeing of wools and woollens.—Dated December 2, 1856.—(A communication.)

May 22, 1857.

2769. William Thomas Henley, of St. John-street-road, Clerkenwell, for electric telegraphs and apparatus connected therewith.—Dated November 22, 1856.

2789. John Orr, of Glasgow, for the manufacture of pile fabrics.—Dated November 24, 1856.

2802. Francis North Clerk, of Birmingham, for metallic roofing for buildings, and in appendages to roofs.—Dated November 26, 1856.

2810. William Woofe, of Weston Birt, Gloucester, for an implement for paring land, applicable also to the removing of turf.—Dated November 27, 1856.

2812. Henry Hedgely, of New-road, Brighton, for spirit-lamps.—Dated November 27, 1856.

2818. Joseph M. Saunders, of Dublin, for cooking ranges.—Dated November 28, 1856.

2819. Henry Turner Sourbuts, of Hyde, Cheshire, for taps or valves, part of which are applicable to lubricators for steam engines, and other purposes.—Dated November 28, 1856.

2820. Henry Waller, of Lickhill, near Calne, Wilts, for vessels used in the manufacture of cheese.—Dated November 28, 1856.

2824. Charles William Siemens, of John-street, Adelphi, for fluid meters.—Dated November 29, 1856.

2840. George Collier, of Halifax, and James William Crossley, of Brighouse, for apparatus used in hot pressing, and in the means of manufacturing parts of apparatus used for such purpose.—Dated December 1, 1856.

2946. Noel Monnier, of Paris, for bridles and bits for stopping horses.—Dated December 1, 1856.

2851. Richard Archibald Brooman, of Fleet-street, London, for bleaching.—Dated December 2, 1856.—(A communication.)

2854. Louis Dominique Girard, of Paris, for hydraulic turbines.—Dated December 2, 1856.

2862. James Mizen, of Deptford, for apparatus for making gas partly applicable to culinary or other domestic purposes.—Dated December 3, 1856.

2869. Julien Denis, of Queenhithe, London, for apparatus for

corking and uncorking bottles without leaving any air between the liquid and the cork.—Dated December 3, 1856.—(A communication.)

2901. STEPHEN RANDOLL SMITH, of Bristol, for anchors.—Dated December 6, 1856.

2936. THOMAS WHEATLEY and WILLIAM WHEATLEY, of Openshaw, near Manchester, for fog-signals and in the means of working the same.—Dated December 11, 1856.

2944. WILLIAM PLAYER MILES, of the Patent Lock Factory, near the Forest Hill Station, London and Brighton Railway, for locks and fastenings.—Dated December 11, 1856.—(A communication.)

3038. WILLIAM SPENCE, of Chancery-lane, for the manufacture of felt.—Dated December 23, 1856.—(A communication.)

3097. RICHARD ARCHIBALD BROOMAN, of Fleet-street, London, for manufacturing articles of earthenware and other ceramic materials, and in the machinery and apparatus employed therein.—Dated December 30, 1856.—(A communication.)

552. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for making preparations from waste silk, cotton, wool, flax, hemp, and other fibrous materials.—Dated February 25, 1857.—(A communication.)

667. CHARLES LUNGLEY, of Deptford Green Dockyard, for constructing dry docks and basins for the stowage of ships.—Dated March 7, 1857.

674. GEORGE PHILCOX, of Stebon-terrace, Stepney, for marine and pocket chronometers, and other timekeepers.—Dated March 9, 1857.

690. JAMES GARTH MARSHALL, of Leeds, for machinery for preparing flax, hemp, China-grass, and other fibrous substances.—Dated March 9, 1857.

716. JOHN SHAW and WILLIAM MANWARING, Banbury, for machinery or apparatus for cutting or reducing turnips or other vegetable substances.—Dated March 12, 1857.

717. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for drawing and preparing silk, cotton, wool, flax, hemp, and other fibrous substances.—Dated March 12, 1857.

736. JAMES THOMPSON, of Black-Ruthven, Perth, for mowing and reaping machines.—Dated March 16, 1857.—(A communication.)

853. GEORGE WHITE, of Port Glasgow, for weaving.—Dated March 26, 1857.

860. GEORGE GILMOUR, of Massachusetts, U. S. A., for a new and useful contrivance or mechanism for shackling or attaching another anchor to the chain of an anchor to which a vessel may be riding, his said invention being termed by him a "second anchor shackle."—Dated March 27, 1857.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

(To the 20th May, 1857, inclusive.)

939. WILLIAM EDWARD NEWTON, of Chancery-lane, for the application of a new or improved material or substance to the construction of certain parts of machinery.—Dated April 24, 1854.—(A communication.)

1056. JOSIAH PENTON and JAMES MACKAY, of Chippenham, Wilts, for the construction of railway wheels and tyres.—Dated May 12, 1854.

995. JOHN HENRY JOHNSON, of Lincoln's-inn-fields, and of Glasgow, for revolving fire-arms.—Dated April 27, 1854.—(A communication.)

982. ALFRED TRUEMAN, of Swansea, for the manufacture of sulphuric acid when roasting copper ores, and also when burning sulphur or iron pyrites.—Dated May 2, 1854.

974. WALTER MACFARLANE, of Glasgow, for water-closets, lavatories, dustbins, and public and domestic conveniences.—Dated May 1, 1854.

975. JAMES FENTON, of Low Moor, Bradford, for safety-valves.—Dated May 1, 1854.

1085. WILLIAM EDWARD NEWTON, of Chancery-lane, for machinery for cutting or shaping wood or other materials.—Dated May 15, 1854.—(A communication.)

1104. JAMES HORSFALL, of Birmingham, for the manufacture of wire for pianofortes and other musical instruments.—Dated May 18, 1854.

971. EDWARD BRIGGS and WILLIAM SOUTER, of Castleton Mills, Rochdale, Lancaster, for treating and preparing silk, and in machinery connected therewith.—Dated May 1, 1854.

1006. EDWIN HASELER, of Wolverhampton, for ornamenting metals, papier maché, horn, and shell.—Dated May 5, 1854.

996. MOSES POOLE, of Regent's Park, for paving or covering the surfaces of roads, streets, or ways.—Dated May 3, 1854.—(A communication.)

1007. ADRIEN GEORGES AMANT MARTIN and CASIMIR LEFOL, of Paris, and of Castle-street, Holborn, London, for the manufacture of iron wheels.—Dated May 5, 1854.

1024. JULIAN BERNARD, of Regent-street, for machinery or apparatus for sewing, stitching, or ornamenting.—Dated May 6, 1854.

1031. THEODORE LEMIELLE, of Bruxelles, Belgium, for apparatus applicable to the ventilation of mines, buildings, and other places.—Dated May 8, 1854.

1055. JOHN PLATT, of Oldham, for apparatus or machines for forging, drawing, moulding or forming spindles, rollers, bolts, and various other articles in metal.—Dated May 12, 1854.

1140. ROBERT ORAM and WILLIAM ORAM, both of Salford, for hydraulic presses.—Dated May 22, 1854.

1014. BERNARD JOACHIM LA MOTHE, of New York, U. S. A., for the construction of buildings.—Dated May 6, 1854.

1015. JOSIAH GEORGE JENNINGS, of Blackfriars, for the manufacture of earthenware pipes for drains and sewers.—Dated May 6, 1854.

1016. BERNARD JOHACIM LA MOTHE, of New York, U. S. A., for the construction of railroad cars.—Dated May 6, 1854.

1019. RICHARD WALLER, of Leeds, for engines and apparatus and means of obtaining motive power from liquids, vapours, gases, or air, parts of which invention may be applied also to ordinary steam or other engines.—Dated May 6, 1854.

1051. WARREN DE LA RUE, of Bunhill-row, Middlesex, for distillation.—Dated May 11, 1854.

1052. HENRY DOULTON, of Lambeth, for kilns used in the manufacture of stoneware, earthenware, and china.—Dated May 11, 1854.

1029. GEORGE BARRY GOODMAN, of Salisbury-place, New-road, for apparatus for holding together letters, music, and other loose sheets.—Dated May 8, 1854.—(A communication.)

1046. JOSEPH SHEPHERD, of Manchester, for compound steam-engines.—Dated May 10, 1854.

1088. GEORGE EDWARD DERING, of Lockleys, Herts, for obtaining motive power by electricity.—Dated May 16, 1854.

1135. LOUIS SAUTTER, of Paris, for lighthouses, and in lamps for lighthouses and other places.—Dated May 22, 1854.

1043. WILLIAM WILLIAMS, of Dublin, for an improved propeller. Dated May 10, 1854.

1044. JOHN ANTHONY and WILLIAM TREEBY CHAFE, of Devonport, for machinery for the manufacture of pipes and tubes from lead and other soft metals and alloys.—Dated May 10, 1854.

1084. JOHN CHEDGEY, of the Grove, Southwark, for rollers and cylinders applicable to various kinds of machinery where a smooth, hard, and regular surface is required.—Dated May 15, 1854.

1058. CHRISTOPHER NUGENT NIXON, of Ramsgate, for attaching rudders to floating vessels.—Dated May 12, 1854.

1065. MOSES POOLE, of Regent's-park, for fire-arms.—Dated May 12, 1854.—(A communication.)

1109. JAMES COLEY MARCH, of Barnstaple, for vices.—Dated May 18, 1854.

1196. HENRY DOULTON, of Lambeth, for the manufacture of junctions for sewers and drains.—Dated May 30, 1854.

1217. JAMES TIMMINS CHANCE, of Birmingham, for machinery for roughing or preparing the surfaces of glass.—Dated June 1, 1854.——(A communication.)

1099. CHRISTOPHER CATLOW, of Clitheroe, and THOMAS COMSTIVE, of Burnley, for shuttles for weaving.—Dated May 17, 1854.

1403. EMILE HUBNER, of Mulhouse, France, for machinery for preparing wool, cotton, silk-waste, tow, and other fibrous materials.—Dated June 26, 1854.

1111. JOHN MACLEAN, jun., and THOMAS FINLAYSON, of Glasgow, for the manufacture or production of ornamental fabrics.—Dated May 18, 1854.

1147. LOUIS EMILE DUFOUR, of Paris, and of Castle-street, Holborn, London, for breach-loading fire-arms.—Dated May 23, 1854.

1115. CHARLES BARLOW, of Chancery-lane, for the manufacture of metallic capsules for covering or securing bottles and other vessels.—Dated May 18, 1854.—(A communication.)

1130. JOHN CROSSLEY, of Newton Moor, near Hyde, Chester, and WILLIAM CROSSLEY, of Failsworth, for Jacquard machines.—Dated May 22, 1854.

1149. JOSEPH KUCZYNSKI, of Paris, for preparing barita and its salts.—Dated May 23, 1854.

1160. THOMAS BALL, of Nottingham, for manufacturing ornamented looped fabrics.—Dated May 24, 1854.

1337. JOSEPH OLIVER, of Wapping, for an improved signal lantern—Dated June 19, 1854.

INDEX

TO

VOL. XXIX.—ENLARGED SERIES.

Acetic acid, H. Condy, improvements in purifying, 144
Adshead, J., application of a known material to be used as a substitute for plastering, painting, papering, whitewashing, and colouring, 235
Albright, A., improvements in lucifer matches, and of boxes suitable for containing the same, 332
Alcohol, H. Hyde, improved mode of purifying, 117
Allen, E. E., and Healey, E. C. See Healey and Allen, 110
Alum, F. G. Spilsbury, improvements in making, 252
Aluminium, A. V. Newton, improved mode of preparing the double chlorides, 133
————, W. E. Newton, improved process for obtaining, 308
Antimony, Beudant and Benoit, certain improvements in treating ores of copper containing, 279
Architectural mouldings, &c., L. A. Desachy, improvements in producing, 417
Armitage, W., and Lea, H., improvement in making iron, 91
Arsenic, Beudant and Benoit, certain improvements in treating ores of copper containing, 279
Artificial fuel, C. D. Gardissal, a new, 406
——— stone, Fontainemoreau, improvements in making, 388
————, L. D. Owen, improvements in, 122
————, W. Petrie, 319
Aspinall, J., improvements in curing sugar, applicable to separating liquids from solids, 1

Ball, W., improvements in separating copper and other metals from their ores, 180
————, improvements in stamping ores, 284
Bannehr, J., improvement in paper, and in mounting copies of written documents thereon, 54
Barlow, P. W., improvement in seasoning timber, 52
Barnsley, S., and T. W. Makin. See Makin and Barnsley, 16
Barratt, O. W., improvements in the dyeing or staining, and ornamenting articles of pearl, bone, and vegetable ivory, 471
Barruel, G., improvements in treating cotton seed, 137
Bauzemont, J., improvements in purifying turpentine, 142
Benoit, J. L. M. P., and Beudant, A. L. See Beudant and Benoit, 279
Bessemer, H., improvements in iron and steel, 377
Beudant, A. L., and Benoit, J. L. M. P., improvements in treating ores of copper containing arsenic and antimony, 279
Bituminous matters, Davis, Syers, and Humfrey, improvements in distilling, 119, 330
Blake, O., improvements in applying the principle of internal reflection within transparent substances, 449

Blake, J., and F. Maxwell, improvements in soap, 397
Boss, J. A., improvements in preparing cane as a substitute for whalebone, 56
Bougies, E. Laporte, manufacture of, 128
Bousfield, G. T., improvements in driving straps or bands, 150
Boyd, I. H., and A. E. Riddle. See Riddle and Boyd, 446
Bracewell, W., and Foulds, R. See Foulds and Bracewell, 195
Bread, H. Mege, improvements in manufacturing, 353
Brick, T. Schwartz, an improved, 360
Bricks, W. Jacobs, an improved composition for bedding, &c., 501
Bristles, A. Smith, for treating vegetable fibres as a substitute for, 60
Brooman, R. A., an improved fermenting agent, 416
——————, improvements in plating glass to render it reflective, 198
——————, method of treating guano and other matters containing uric acid, 61
Brown, J., new or improved machinery to be used in the manufacture of iron, 271
Brunel, B. F., improvements in Prussian blue, 10
Buff, H. L., and Versmann, F., improvement in purifying and softening water, 108
Buffers, R. Chrimes, improvements in, 89

Calico printing, G. J. Mackelcan, improvements in, 268
Calley, S., improved compositions for coating or covering surfaces, particularly the bottoms of ships and vessels, 488
Calvert, F. A., improvements in opening, cleaning, and carding cotton, and other fibrous materials, 276
Candles, E. Laporte, manufacture of, 128
Cane, J. A. Boss, improvements in preparing, 56
Cantelo, W. J., improvements in the preservation of vegetable matters, 33
Caoutchouc, A. Ford, improvements in dissolving, 487
——————, A. Lorimier, an improvement in reworking vulcanized, 419
——————, Gidley and Christopher, improvements in treating, 149
——————, W. C. Fuller, improvements in adapting it as tyres for wheels, 35
Carbonate of ammonia, J. Ellis, improvements in the manufacture of, 441
Carbonates, J. H. Johnson, improvements in the manufacture of, 250
Carding, &c., cotton, F. A. Calvert, improvements in, 276
Casting, B. T. Ortet, a new metallic composition for, 229
Casting metals, J. and R. Jobson, improvements in, 265, 289
Cast steel, J. B. Howell, improvements in, 471
——————, L. J. B. Manevy, improvements in, 66
Cement, Holcroft and Johnson, improvements in, 310
——————, H. Y. D. Scott, improved mode of manufacturing, 25
Cementing glass, L. Cornides, improvements in, 236
Ceramic manufactures, W. Illingworth, improvements in, 124
Chamblant, P. M. J., improvements in glass, 459
Chance, J. T., improvements in furnaces used for flattening glass, 491
China, W. Illingworth, improvements in printing, &c., 124
Chlorides, A. V. Newton, improved mode of preparing, 133
Chrimes, R., improvements in buffers and other springs for railway and other carriages, 89
Christopher, W., and Gidley, G. See Gidley, G., and Christopher, W., 149
Christophers, J., improvements in knives and forks, 50
Clark, J., improvements in waterproof fabrics, 147
Claus, C. F., and T. Squire. See Squire and Claus, 24
Clayton, W., improved manufacture of soap, 9
Clements, C. F., an improvement in separating copper and other metals from ores containing them, 480

Coal, shale, &c., A. V. Newton, method of obtaining oil from, 71
Coating iron, J. McInnes, an improved surface mineral for, 467
————, W. Tytherleigh, improved method of, 69
Coating ships' bottoms, &c., S. Calley, improved composition for, 488
————, P. Ward, improved composition for, 297
—— surfaces, B. F. Ortet, a new metallic composition for, 229
Colouring matter, J. Gedge, improvements in, 384
—— matters, R. A. Brooman, improvements in treating guano and uric acid for obtaining, 61
Condy, H., improvements in defecating or purifying acetic acid and other solutions, also in disinfecting rooms and other places, and in preserving wood, 144
Copper, Vivian, Herrmann, and Morgan, improvements in obtaining, 113
——, and other metals, C. F. Clements, an improvement in separating from their ores, 480
Cornides, L., improvements in cementing and uniting together plain or ornamented surfaces of glass to surfaces of metal or other material, 236
————, improvements in ornamenting metal, wood, leather, textile fabrics, and other substances, 299
————, a new method of dressing or preparing hides, skins, intestines, and such like animal substances, 391
Cotton seed, R. Schramm, a new process for treating, 306
—— waste, T. Wrigley, certain improvements in cleaning, 315
Curtis, W. J., improvements in lubricating axles, &c., 98
Cutting metals, J. Denis, improvements in, 313

Daft, T. B., improvements in cast iron pipes, 214
Dale, T., J. Roberts, and J. D., Pritchard. See Roberts, Dale, and Pritchard, 495
Davies, E., Syers, J. M., and Humfrey, C., improvements in distilling resinous, bituminous, fatty and oily matters, and in the treatment of certain products therefrom, 119, 330
De Briges, A., and Lucas, J. L. See Lucas and Briges, 226
De Cockkenifeck, J., improved process and apparatus for preparing, refining, and filtering oils or fatty matters, 188
Denis, J., an improved soap, 311
————, improvements in cutting or perforating steel and other metals, 313
Deodorizing, Warriner, G., improvements in, 409
Dering, G. E., improvements in galvanic batteries, 106
Desachy, L. A., improvements in producing architectural mouldings, ornaments, and other works of art, formed with surfaces of plaster or cement, 417
Destroying insects, &c., E. H. C. Monckton, the application of a means for, 323
Disinfecting rooms, H. B. Condy, improvements in, 144
Distilling, Davies, Syers, and Humfrey, improvements in, 119, 330
Doat, V., improved galvanic battery, 21
Doubleday, H., improvement in starch, 213
Driving bands, &c., J. Hague, improvements in, 453
—— straps, &c., G. T. Bousfield, improvements in, 150
Dufresne, A. H., improved process of gilding and ornamenting steel and other metals, 134
Dyeing, &c., pearl, &c., O. W. Barratt, improvements in, 471

Earthenware, W. Illingworth, improvements in printing, colouring, &c., 124
Electric light, J. T. Way, improvements in, 493
—— telegraphs, J. T. Pitman, a new method of, 455
Elliot, G., improvements in the production of oxides of manganese, 465
Ellis, J., improvements in the manufacture of muriate of ammonia and carbonate of ammonia, and in converting certain ingredients employed therein into an artificial manure, 441

Embossing fabrics, Makin and Barnsley, improvements in, 16
Engraving glass, &c., C. D. Gardissal, improvements in, 301

Fabric for printing, J. and R. Kenyon, an improved, 367
Fats, G. Hutchinson, improvements in treating, 293
Fatty matters, Davies, Syers, and Humfrey, improvements in distilling, 119, 330
——— ———, J. De Cockkenifeck, improved process for preparing, &c., 188
Fermenting agent, R. A. Brooman, for the preparation of a, 416
Fertilizing, G. Warriner, improvements in, 409
Fibrous substances, C. A. Messager Abit, improvements in the treatment of, 249
Filters, W. Petrie, a new porous material for, 319
Fontainemoreau, P. A., certain improvements in artificial stone for statues and ornamental purposes, 388
Ford, A., improvements in dissolving vulcanized india rubber for waterproofing purposes, 487
Forks, J. Christophers, improvements in, 50
Foulds, R., and Bracewell, W., improvements in power looms, 195
Fox, S., improvements in springs for railway and other carriages, 46
Fuller, W. C., improvements in adapting india rubber as tyres for wheels, 35

Galvanic batteries, G. E. Dering, improvements in, 106
——— battery, V. Doat, an improved, 21
Gardissal, C. D., a mode of treating and preparing seaweeds or marine plants for manure, 408
——— ———, a new artificial fuel, 406
——— ———, improvements in engraving glass and crystals, 301
Gas, Marriott and Sugden, an improvement in purifying, 469
Gauntlett, W. H., improvements in thermometric apparatus, 101
Gedge, J., improvements in paint or colouring matter applicable to coating metals and other substances, whereby the oxidation of metal is prevented, and resistance to the action of the atmosphere, rays of heat, or acid, is secured, 384
Gidley, G., and Christopher, W., reducing imported india rubber to a transparent liquid state, so that it may be used as a transparent varnish or solution for mixing with colours, 149.
Gilding, &c., steel, A. H. Dufresne, improved process of, 134
Gill, W. E., and Sheridan, H. B., treating fish for oil and utilizing the products of such process, 153
Glass, P. M. J. Chamblant, improvements in, 459
———, L. Cornides, improvements in cementing to metal, 236
——— furnaces, J. T. Chance, improvements in, 491
Gold, Vivian Herrmann and Morgan, improvements in obtaining, 113
Goodyear, C., an improvement in combining gutta percha and asphalt or pitch, 296
———————, jun., improvements in the manufacture of penholders and handles for penholders, 305
Gossage, W., improvements in soap, 138, 385
Guano, R. A. Brooman, treating for obtaining colouring matters from, 61
Gunpowder, T. W. Willett, improvements in, 193
Guns, W. Morgan, improvements in, 216
Gutta percha, &c., C. Goodyear, an improvement in combining, 296

Hague, J., improvements in bands or cords for driving machinery and other purposes, 453
Half stuff, T. Routledge, improvements in, 382
Heal, J. H., improvement in hair and wool mattresses, 49
Healey, E. C., and Allen, E. E., improvement in preparing for use veneers, paper, and other fabrics, 110
Heating cylinders, W. Morgan, an improvement in, 498
Herrmann, B. G., Vivian, H. H., and Morgan, W. See Vivian, Herrmann, and Morgan, 113

Hickson, M., improvements in water-proofing certain woven fabrics, 490
Hill, C., improvements in lubricating matters, 292
Hogg, J., and Napier, J., improvements in stereotyping, 39
Holcroft, G., and Johnson, P., improvements in cement and in the application of a known material to cementing purposes, 310
Hops, Lucas and De Briges, improvements in a substitute for, 226
Horsfall, J., improvements in wire for pianofortes and other musical instruments, 325
———, improvements in wire rope, 326
Howell, J. B., improvements in cast steel, 471
Howell, J. B., and J. J. Russell. See Russell and Howell, 329
Humfrey, C., Syers, J. M., Davies, E. See Davies, E., Syers, J. M., and Humfrey, C, 119, 330
Hutchinson, G., improvements in the treatment of oils and fats, 293
Hyde, H., improved lubricating compound, 75
———, improved mode of purifying alcohol or alcoholic spirits, 117

Illingworth, W., improvements in printing or colouring and glazing china, earthenware, or other ceramic manufactures, 124
Incrustation of steamboilers, E. Topham, Preventing, 207
India-rubber, A. Ford, improvements in dissolving vulcanized, 487
———, A. Lorimier, an improvement in re-working vulcanized, 419
———, Gidley and Christopher, improvements in treating, 149
——— tyres, W. C. Fuller, improvements in, 35
Iron, Armitage and Lea, improvement in making, 91
———, H. Bessemer, improvements in making, 377.
———, J. Brown, improved machinery for the manufacture of, 271
———, J. G. Martien, improvements in, 14, 481
——— ships, W. Radford, improvements in metallic sheets, &c., for, 374

Jacobs, W., an improved composition for bedding and rendering bricks in furnaces, 501
James, H. B., improvements in moulding metallic castings, 364
Jobson, J. and R., improvements in moulds for casting metals, 265, 289
Johnson, J. H., improvements in safety paper, 210
——— ———, improvements in the production of carbonates of barytes, 250
———, P., and G. Holcroft. See Holcroft and Johnson, 310
Johnston, J., improvements in photographic plates, 389
Joining fabrics, J. and R. Kenyon, 367

Kenyon, J. and R., an improved fabric to be used in printing, and other similar purposes, and a method of joining or connecting the ends of the same, 367
Knives, J. Christophers, improvements in, 50

Llanglois, C., improvements in photography, 380
Laporte, E., manufacture of bougies, candles, and other similar articles, 128
Lea, H., and Armitage, W. See Armitage and Lea, 91
Leigh, J., for sizeing, stiffening or otherwise preparing cotton, linen, or other yarns and woven fabrics, 17
Light, J. T. Way, improvements in obtaining by electricity, 493
Lister, S. C., improvements in preparing and spinning cotton, flax, and similar fibres, 477
Lord, J., certain improvements in the process of separating or recovering animal wool, or silk from cotton and woollen, or from cotton and silk, or other mixed fabrics, whereby the animal wool or silk is rendered capable of being again employed, which said improvements are also applicable to wool in its unmanufactured state, 463
Lorimier, A., an improvement in re-working vulcanized india-rubber, 419
Lubricating, W. J. Curtis, improvements in, 98
———, C. Hill, improvements in, 292

Lubricating compound, H. Hyde, an improved, 75
Lucas, J. L., and Briges, A. De, improvement in preparing certain liquid or solid alimentary substances from the husk of a certain fruit, 226
Lucifer matches, A. Albright, improvements in, 332
Lurig, G., improvements in manufacturing saltpetre, 19
Lynn, W., improvements in screws for propelling vessels, 6

McInnes, J., an improved surface mineral coating for protecting iron and other substances, and an improved vehicle or varnish by which it is applied, and which varnish may be used with or without the addition of other substances, 467
Macintosh, J., improvements in the application of incendiary materials to be used in warfare, 217
Mackelcan, G. J., improvements in rollers adapted to calico and other printing, 268
Maddison, W. P., improved telegraph or apparatus for the transmission of signals, 186
Makin, T. W., and Barnsley, J., improvements in embossing moire antique water on all kinds of woven fabrics, 16
Malleable cast iron, D. Morrison, improvements in manufacturing articles from, 48
Manevy, L. J. B., improvements in cast steel, 66
Manning, J. A., improvements in manure, 230
Manure, J. Ellis, improvements in, 441
———, C. D. Gardissal, a mode of treating, &c., seaweeds for, 408
———, J. A. Manning, improvements in, 230
———, F. C. Matthews, for the manufacture of, 500
———, Squire and Claus, improvements in, 24
Marriot, W., and D. Sugden, an improvement in purifying coal gas, 469
Martien, J. G., improvements in iron, 14, 481
Matthews, F. C., improvements in preparing manure, 500
Mattresses, J. H. Heal, improvements in, 49
Maxwell, F., and J. Blake. See Blake and Maxwell, 397
Mege, H., improvements in the manufacture of bread, 353
Messager-Abit, C. A., improvements in the treatment of fibrous substances, 249
Metallic beams, &c., W. Radford, improvements in, 374
——— vessels, A. F. Remond, improvements in certain kinds of, 369
Minerals, rocks, &c., W. Radley, improvements in treating, 238
Monckton, E. H. C., improvements in destroying grubs and other insects or animalculæ or infusoria injurious to plants, 323
Morgan, W., Vivian, H. H., and Herrmann, B. G. See Vivian, Herrmann, and Morgan, 113
Morgan, W., an improvement in heating parts of cylinders and other hollow bodies of iron to a welding heat, 498
Morgan, W., improvements in guns and mortars, 216
Morrison, D., improvements in the manufacture of articles from malleable cast iron, 48
Mortars, W. Morgan, improvements in, 216
Moulding, H. B. James, improvements in, 364
———, B. F. Ortet, a new metallic composition for, 229
Moulds, J. and R. Jobson, improvements in, 265, 289
Mounting documents on paper, J. Bannehr, improvements in, 54
Muriate of ammonia, J. Ellis, improvements in the manufacture of, 441
Muschamp, W., improvements in paper to render the same waterproof, 47
Music, L. Normandy, inprovements in writing and printing, 103

Napier, J., and J. Hogg. See Hogg and Napier, 39
Neilson, M., improvements in the treatment of yarns or threads, 208
Newman, A. L., improvements in processes for separating animal from vegetable fibre, and for adopting the products to manufacturing

purposes, and in the machinery employed therein, 483
Newton, A. V., improved furnace for heating soldering irons, 205
————, improved mode of preparing the double chlorides of aluminium and sodium of aluminium and potassium, 133
————, method of obtaining purified oil from coal, shale, and other bituminous substances, 71
———, W. E., a new or improved process for obtaining aluminium, 308
Normandy, L., improvements in writing and printing music, 103
Norris, R. H., certain improvements in photography by the use of collodion in a dry condition, and for a means of transferring photographic films, 396
North, S. R., and Peacock, R., improvements in metallic packings for pistons, 7

Oil, Gill and Sheridan, improvements in treating fish for, 153
——, A. V. Newton, method of obtaining, 71
—— from cotton seed, R. Schramm, a new process for obtaining, 306
Oils, J. De Cockkenifeck, improved process for preparing, &c., 188
——, G. Hutchinson, improvements in, 293
Ordnance, W. Morgan, improvements in, 216
Ores, W. Ball, improvements in separating metals from, 180
——, Beudant and Benoit, certain improvements in treating, 279
——, C. F. Clements, an improvement in separating metals from, 480
Ornamenting articles of pearl, &c., O. W. Barratt, improvements in, 471
———— metal, &c., L. Cornides, improvements in, 299
Ortet, B. F., a new metallic composition, applicable to the coating of surfaces, and to the moulding and casting of various objects, 229
Owen, L. D., improvements in the manufacture of artificial stone, 132
Oxalate of soda, Roberts, Dale, and Pritchard, improvements in purifying, 495
Oxalic acid, Roberts, Dale, and Pritchard, improvements in, 495
Oxides of manganese, G. Elliot, improvements in, 465

Packings for pistons, North and Peacock, improvements in, 7
Paint, J. Gedge, improvements in, 384
Painting, &c., J. Adshead, application of a known material as a substitute for, 235
Paper, J. Bannehr, improvement in preparing, 54
——, Healey and Allen, improvements in preparing, 110
——, J. H. Johnson, improvements in, 210
——, W. Muschamp, improvements in waterproofing, 47
——, T. Routledge, improvements in pulp for, 382
——, Rack and Touche, improvements in the manufacture of, 211
——, T. Wrigley, certain improvements in cleaning cotton waste for, 315
Papineau, W., improvement in the production of spirits of wine, 116
Patents sealed, 77, 164, 254, 342, 427, 504
Peacock, R., and North, S. R. See North and Peacock, 7
Penholders, C. Goodyear, jun., improvements in, 305
Permanent ways, C. W. Ramie, improvements in, 94
Petrie, W., a new porous material for filters and other like articles, 319
Photographic plates, J. Johnston, improvements in, 389
Photography, C. Langlois, improvements in, 380
————, R. H. Norris, certain improvements in, 396
————, W. Thistlethwaite, improvements in, 131
Pianofortes, J. Horsfall, improvements in wire for, 325
Pipes, T. B. Daft, improvements in cast iron, 214
Pitman, J. T., a new method of using the electric current or currents for telegraphic and other purposes, 455

Plastering, &c., J. Adshead, application of a known material as a substitute for, 235
Plating glass, R. A. Brooman, improvements in, 198
Pontifex, E. L., improvement in the manufacture of tartaric and citric acids, and tartrate of potash and soda, 30
Potassium, A. V. Newton, improved mode of preparing the double chlorides of, 133
Power looms, Foulds and Bracewell, improvements in, 195
Preparing colours, A. D. Schratz, improvements in, 58
——— cotton, &c., S. C. Lister, improvements in, 477
——— hides, &c., L. Cornides, a new method of, 391
Preserving, G. Warriner, improvements in, 409
——— timber, P. W. Barlow, improvements in, 52
——— vegetable matters, W. J. Cantelo, improvements in, 33
——— wood, H. B. Condy, improvements in, 144
———, R. W. Sievier, improvements in, 339
Printing music, L. Normandy, improvements in, 103
Pritchard, J. D., J. Roberts, and T. Dale. See Roberts, Dale, and Pritchard, 495
Propelling, W. Lynn, for improvements in screws for, 6
Prussian blue, B. F. Brunel, improvements in, 10
Purifying, &c., water, Buff and Versmann, improvements in, 108
Pye, G., improvement in preparing silk, 248

Radford, W., improvements in metallic beams or bracings, and metallic sheets or plates, applicable to the building of ships and other structures where lightness and strength are required, 374
Radley, W., improvements in preparing and treating auriferous, argentiferous, and cupreous rocks, minerals, and alluviums, 238
Railways, C. W. Ramie, improvements in the permanent way of railways, 94
Recovering wool, &c., J. Lord, improvements in, 463
Reflecting light, O. Blake, improvements in, 449
Remond, A. F., improvements in certain kinds of metallic vessels, 369
Resinous matters, Davies, Syers, and Humfrey, improvements in distilling, 119, 330
Riddle, A. E., and J. H. Boyd, improvements in tanning by machinery and chemicals, 446
Roberts, T., J. Dale, and J. D. Pritchard, improvements in obtaining and purifying oxalate of soda, which improvements are also applicable to the manufacture of oxalic acid, 495
Rollers for calico printing, G. J. Mackelcan, improvements in, 268
Routledge, T., improvements in half stuff and paper, 382
Royds, R., improvements in soap, 130
Ruck, W. D., improvement in tanning, 68
——— and Touche, V., improvements in paper from fibres not hitherto applied to such purposes, 211
Russell, J. J., and J. B. Howell, improvements in cast steel tubes, 329

Saltpetre, G. Lurig, improvements in the manufacture of, 19
Sautelet, E. C. F., improved process of tanning, 27
Sayers, E., C. Humfrey, and E. Davies. See Davies, Sayers, and Humfrey, 330
Schramm, R., a new process for treating cotton seed for the purpose of and previous to the obtaining of oil from it, 306
Schratz, A. D., improvements in preparing colours for the impression of woven or textile fabrics, or stuffs of any kind, 58
Schwartz, T., an improved brick, 360
Scientific miscellanea, 157, 158, 427, 502
Scott, H. Y. D., improved cement, 25
Screw propellers, W. Lynn, improvement in, 6

Seasoning timber, P. W. Barlow, improvement in, 52
Separating copper, &c., W. Ball, improvements in, 180
———— fibres, A. L. Newman, improvements in, 483
———— liquids, J. Aspinall, improvements in machinery for, 1
Sheridan, H. B., and Gill, W. E. See Gill, W. E., and Sheridan, 153
Sievier, R. W., improvements in preserving wood from decay and also from destruction by insects, 339
Signals, W. P. Maddison, improved telegraph, 186
Silk, G. Pye, improvement in preparing, 248
Silver, Vivian, Herrmann, and Morgan, improvements in obtaining, 113
Sizeing fabrics, J. Leigh, improvements in, 17
Smelting ores, J. L. Tabberner, certain improvements in, 390
Smith, A., treating vegetable fibres as a substitute for bristles in paint and other brushes, 60
———, W., improvements in steel wire for musical instruments, sewing needles, and other purposes, 327
Soap, Blake and Maxwell, improvements in, 397
———, W. Clayton, improvements in, 9
———, J. Denis, an improved, 311
———, W. Gossage, improvements in, 138, 385
———, R. Royds, improvements in, 130
Soda, F. G. Spilsbury, making, 252
Sodium, A. V. Newton, improved mode of preparing, 133
Soldering irons, A. V. Newton, improved furnace for, 205
Spilsbury, F. G., for making soda and alum, 252
Spinning cotton, &c., S. C. Lister, improvements in, 477
Spirits of wine, W. Papineau, improvement in the production of, 116
Springs, R. Chrimes, improvements in, 89
———, S. Fox, improvements in, 46
Squire, T., and Claus, C. F., improvements in artificial manure, 24
Stamping ores, W. Ball, improvements in, 284
Starch, H. Doubleday, improvements in, 213
———, W. Watt, improvements in, 316
Steel, H. Bessemer, improvements in the manufacture of, 377
——, J. Denis, improvements in cutting, &c., 313
——, J. B. Howell, improvements in cast, 471
——, G. C. Thomas, an improved method of making, 394
—— wire, W. Smith, improvements in, 327
Stereotyping, Hogg and Napier, improvements in, 39
Sugar, J. Aspinall, improvements in machinery for curing, 1
Sugden, D., and W. Marriot. See Marriot and Sugden, 469
Syers, J. M., Davies, E., Humfrey, C. See Davies, E., Syers, J. M., and Humfrey, C., 119

Tabberner, J. L., certain improvements in smelting ores, 390
Tanning, Riddle and Boyd, for improvements in, 446
————, W. D. Ruck, improvement in, 68
————, E. C. T. Sautelet, improved process of, 27
Tartaric acids, E. L. Pontifex, improvement in the manufacture of, 30
Tartrate of potash and soda, E. L. Pontifex, improvement in the manufacture of, 30
Telegraph signals, W. P. Maddison, improved, 186
Thermometric apparatus, W. H. Gauntlett, improvements in, 101
Thistlethwaite, W., improvements in photography, 131
Thomas, G. C., an improved method of making steel, 394
Threads, M. Neilson, improvements in treating, &c., 203
Titterton, C., improvements in zinc and zinc white, 461
Topham, E., cleansing out the sediment from the water in steam boilers and preventing incrustation of the same, 207
Touche, V., and Ruck, W. D. See Ruck and Touche, 211

Treating cotton seed, G. Barruel, improvements in 137
——— vegetable fibres, A. Smith, for a substitute for bristles, 60
Tubes, J. Webster, improved elastic metallic, 177
Tubes, Russell and Howell, improvements in cast steel, 329
Turpentine, J. Bauzemont, improvements in, 142
Tytherleigh, W., improved method of coating or covering iron with copper or alloys of copper, 69

Uric acid, R. A. Brooman, treating for colouring matters, 61

Varnish, Gidley and Christopher, improvements in, 149
———, J. McInnes, an improved, 467
Veneers, Healey and Allen, improvements in preparing, 110
Versmann, F., and Buff, H. L. See Buff and Versmann, 108
Vivian, H. H., Herrmann, B. G., and Morgan, W., improvements in copper and in obtaining gold and silver from ores, 113

Walnut husks, Lucas and De Briges, improvements in preparing, 226
Ward, P., improved composition for coating the bottoms of ships, 297
Warfare, J. Macintosh, improvements in materials for the purpose of, 217
Warriner, G., improvements in compounds for preserving, deodorizing, and fertilizing, 409
Waterproof fabrics, J. Clarke, improvements in, 147
Waterproofing fabrics, M. Hickson, improvements in, 490
——— paper, W. Muschamp, improvements in, 47
Watt, W., improvements in starch, 316
Way, J. T., improvement in obtaining light by electricity, 493
Webster, J., improved elastic metallic tube, 177
Whalebone, J. A. Boss, improvements in preparing cane as a substitute for, 56
Wheels, W. C. Fuller, improvements in adapting india rubber as tyres for, 35
Willett, T. W., improvements in gunpowder, 193
Wire, W., Smith, improvements in the manufacture of, 327
—— for pianofortes, &c., J. Horsfall, an improvement or improvements in, 325
—— rope, J. Horsfall, an improvement in, 326
Wool, J. Lord, certain improvements in recovering, &c., 463
Wrigley, T., certain improvements in cleaning cotton waste or other materials used in the manufacture of paper, 315

Yarns, M. Neilson, improvements in the treatment, &c., 203

Zinc, C. Titterton, improvements in, 461
—— white, G. Titterton, improvements in, 461

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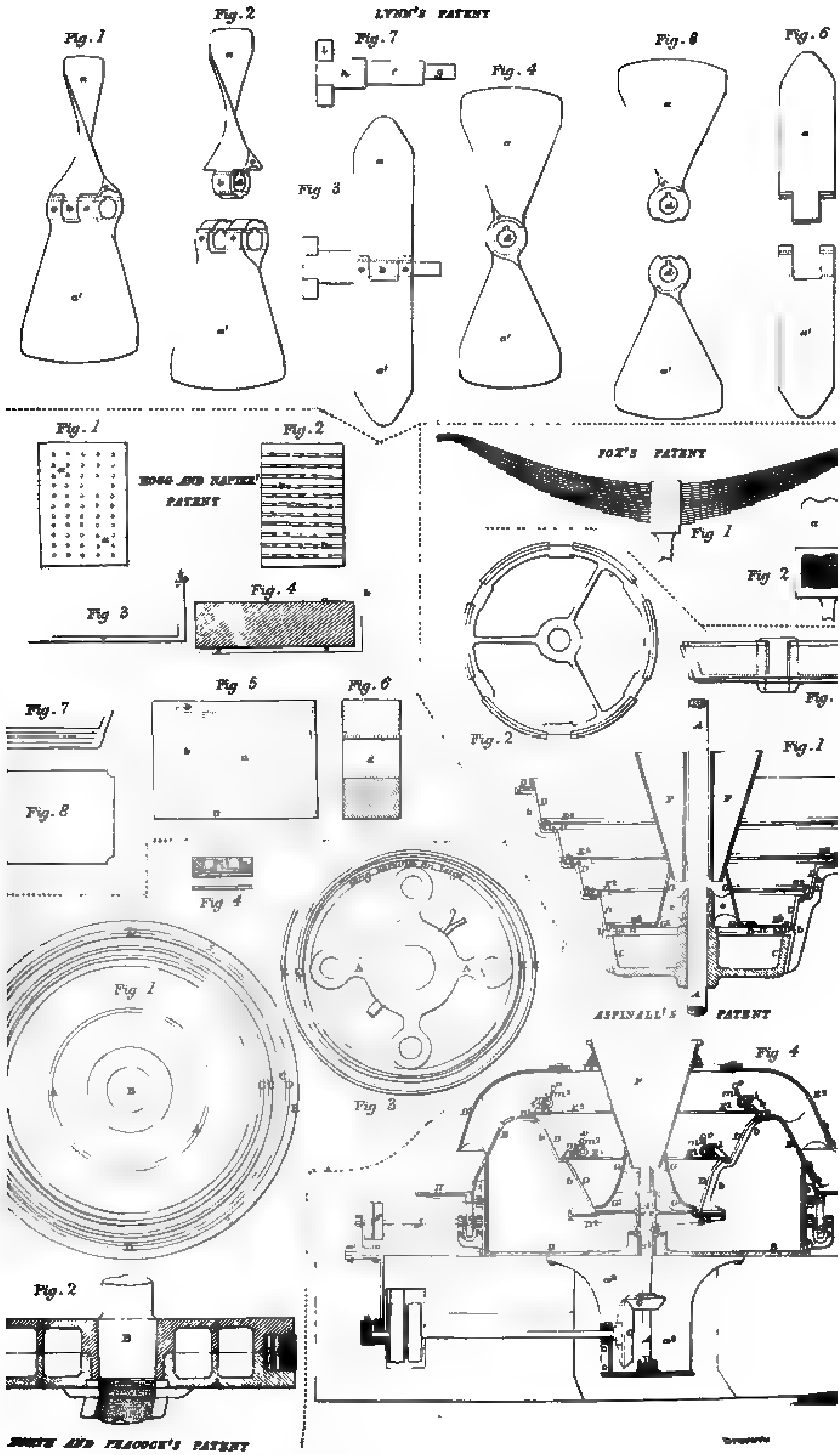
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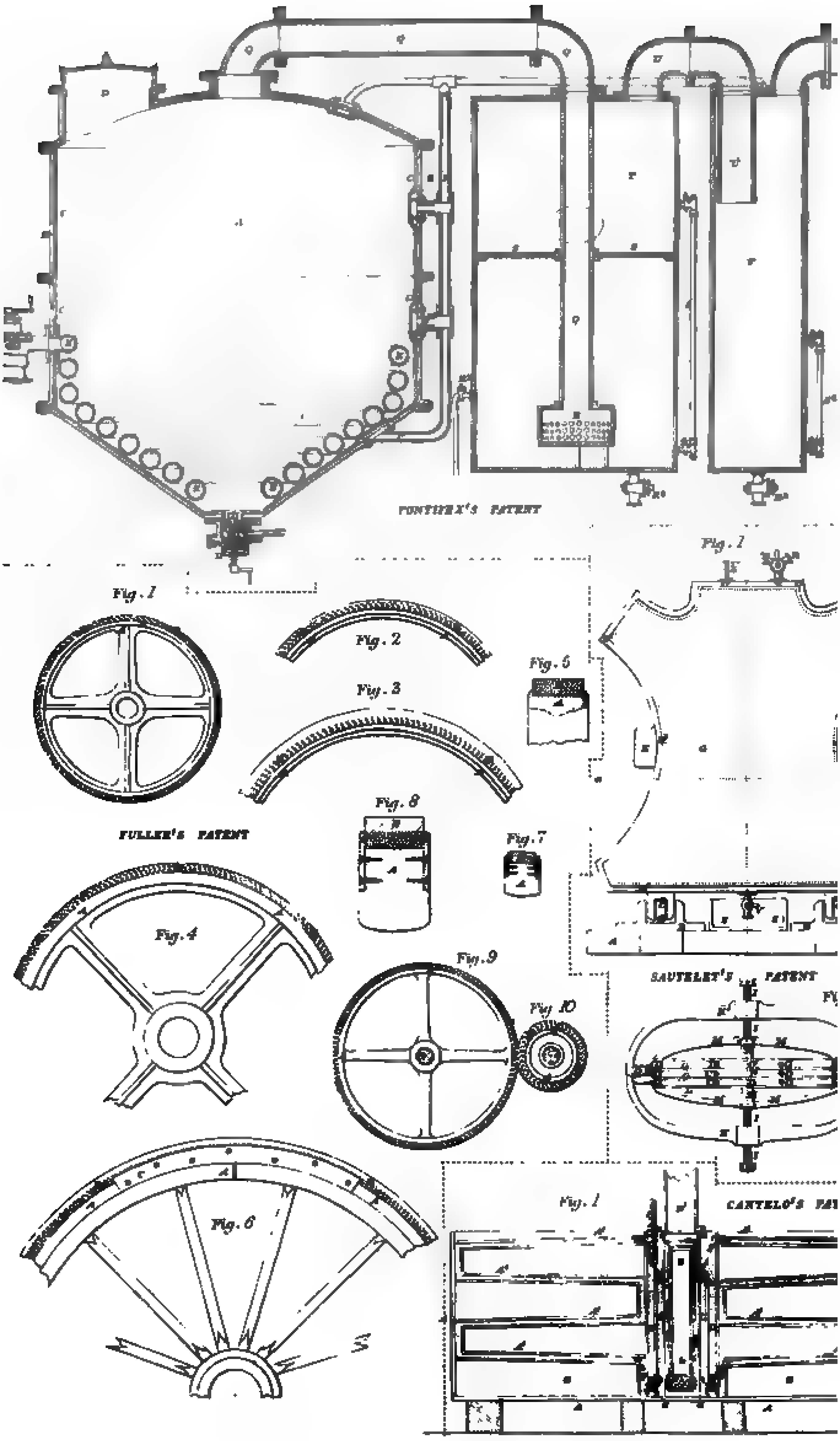

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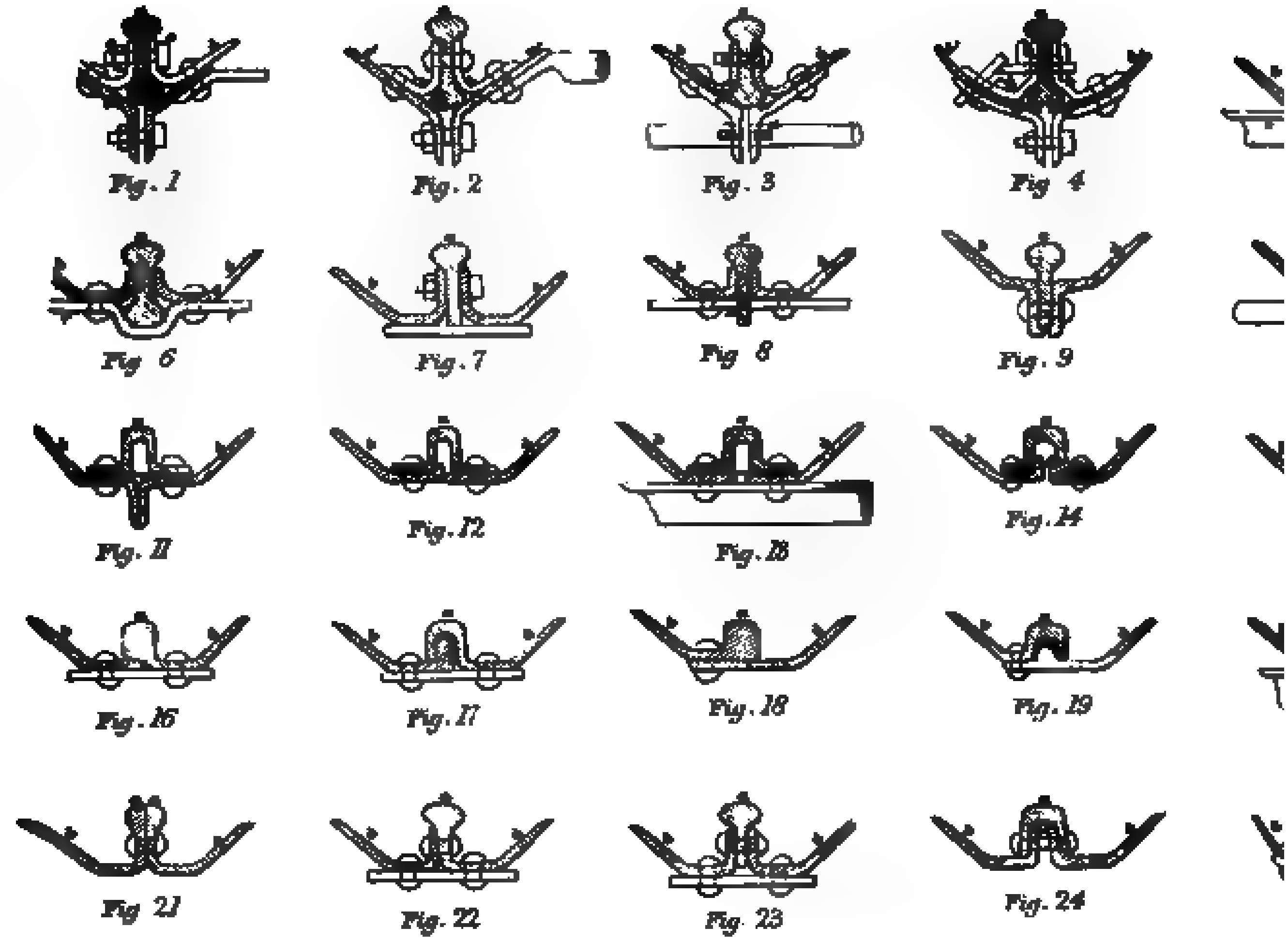

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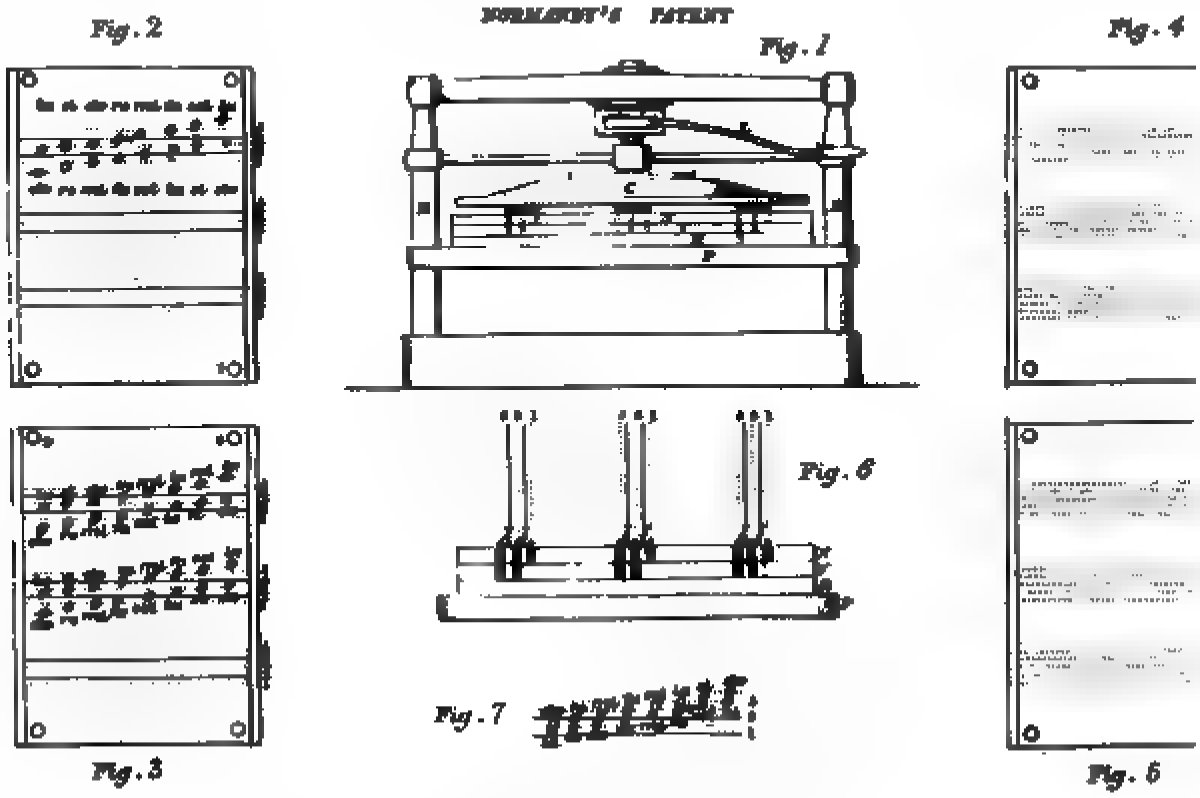

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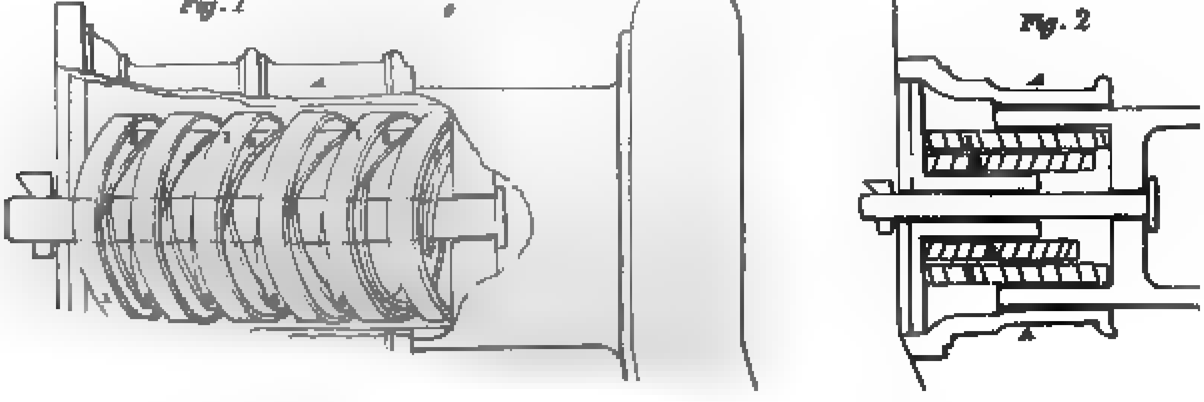

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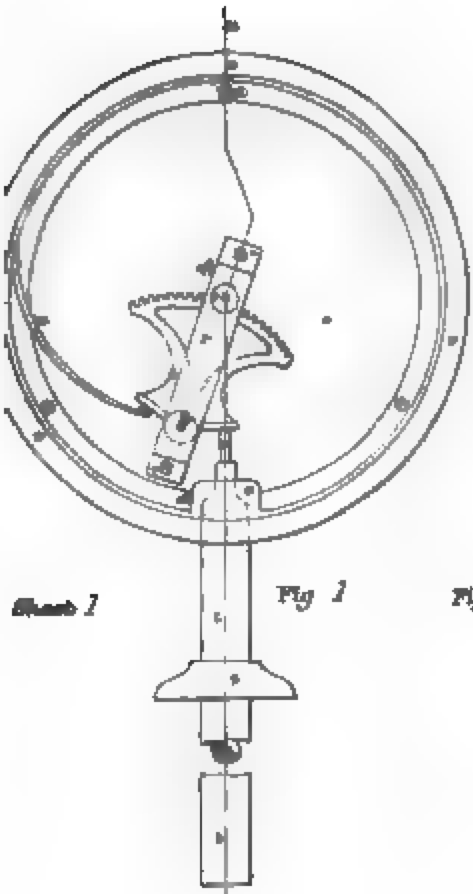


Fig. 1

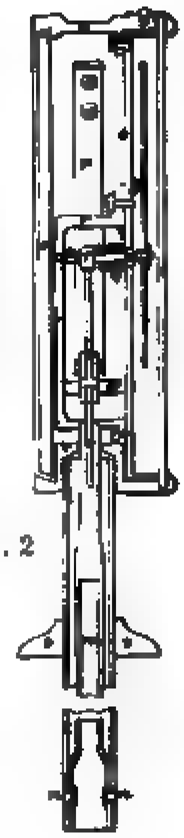


Fig. 2

GAUNTLETT'S PATENT

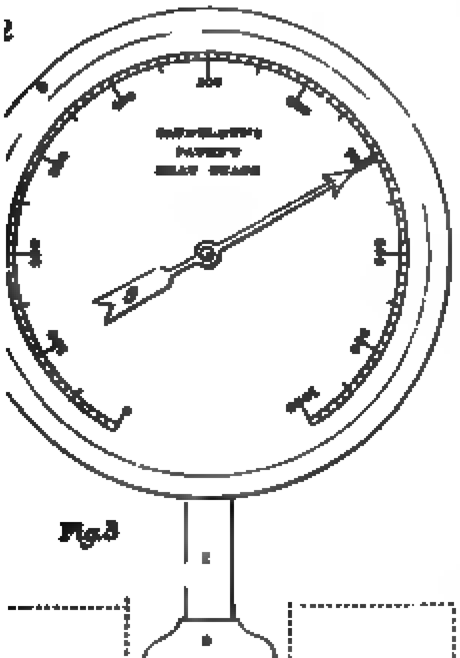
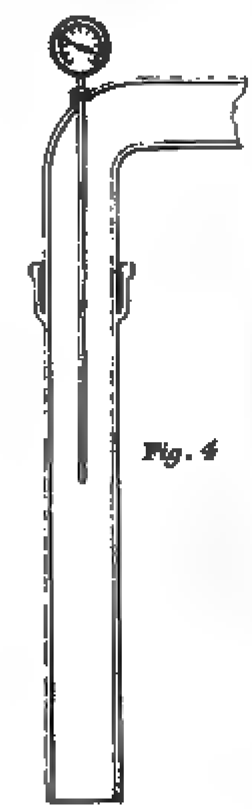


Fig. 3



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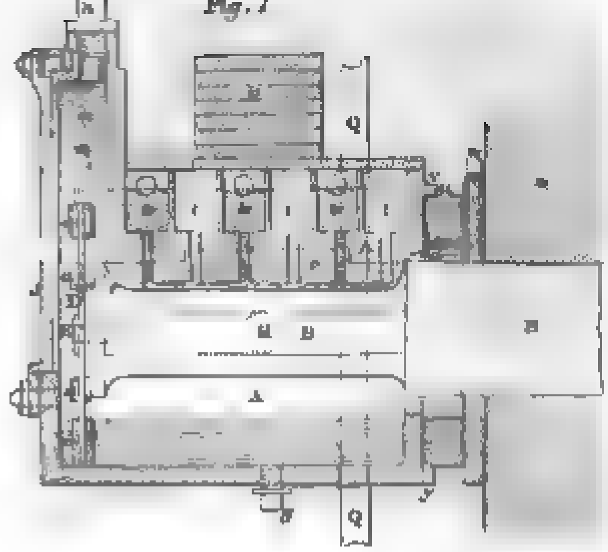

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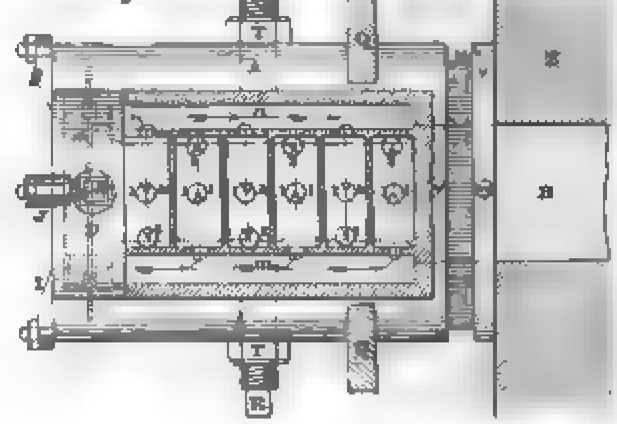

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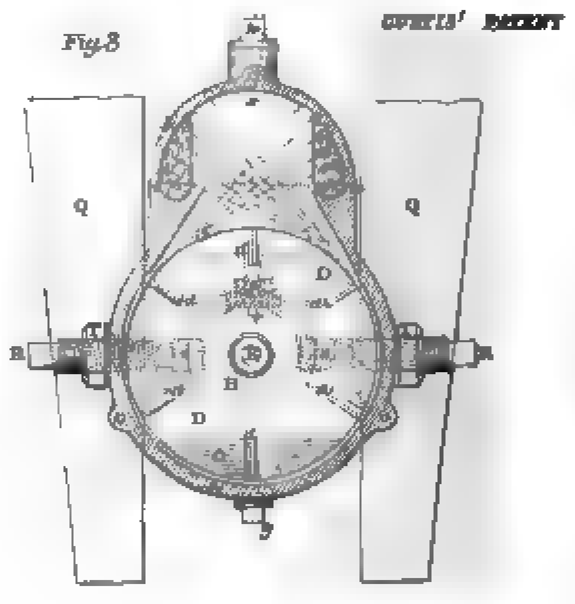

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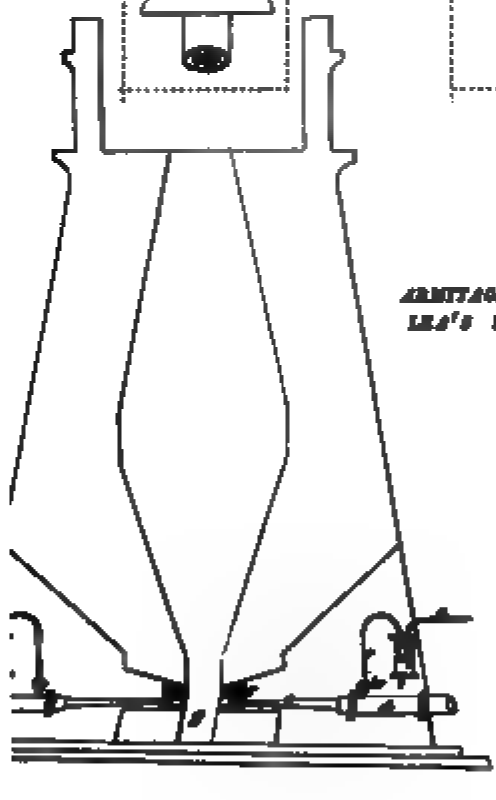

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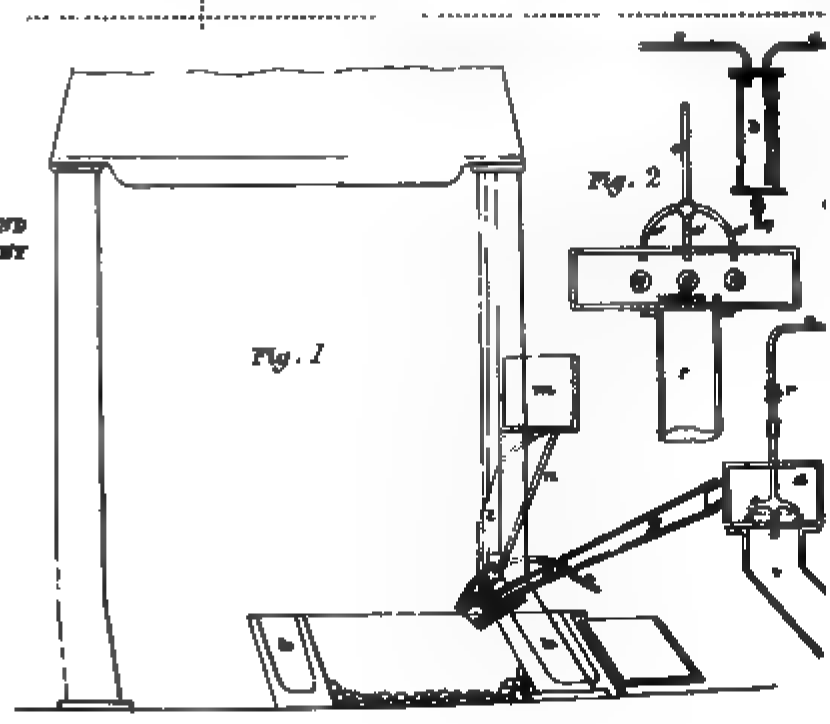

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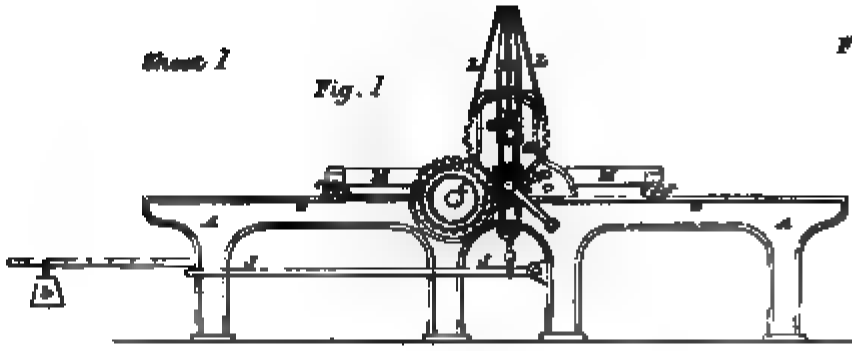

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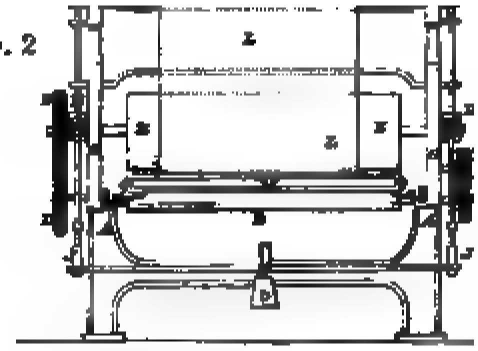

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Fig 4

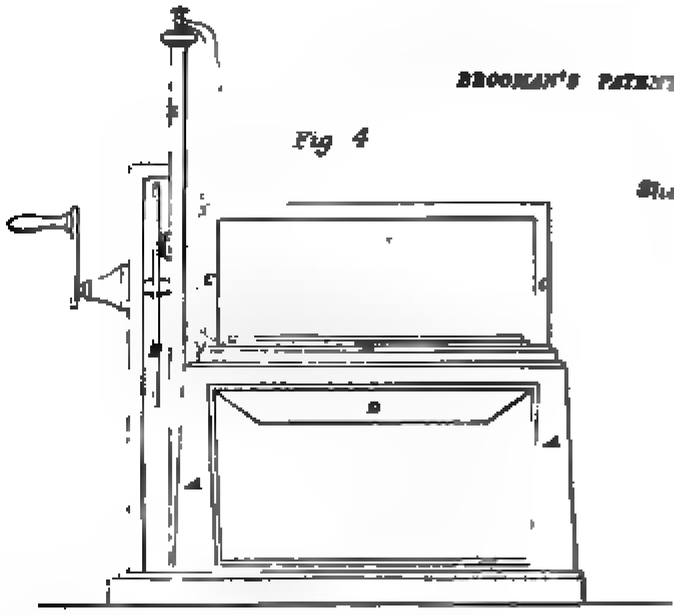

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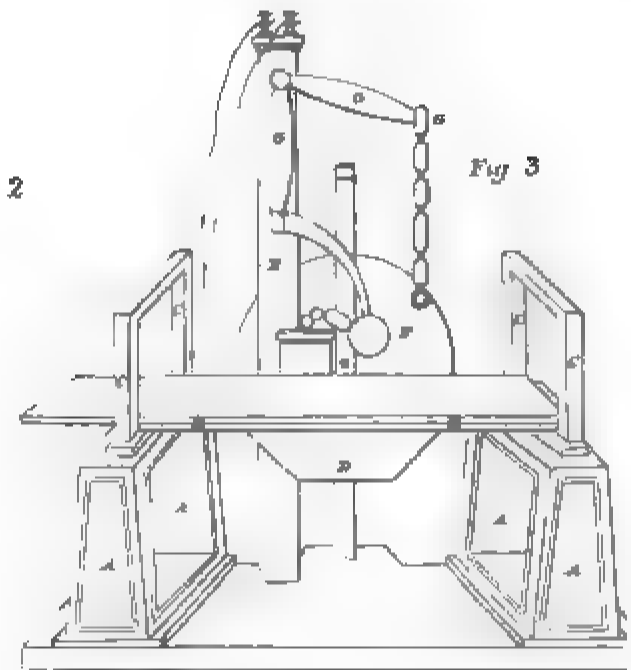
Fig 3



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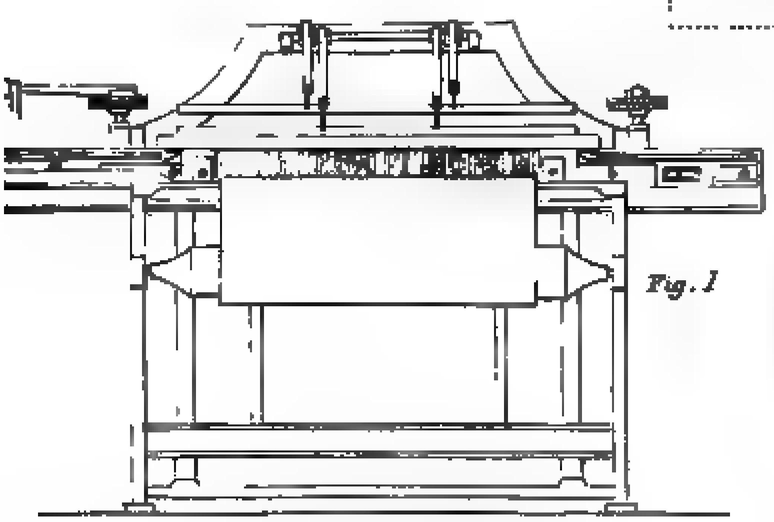

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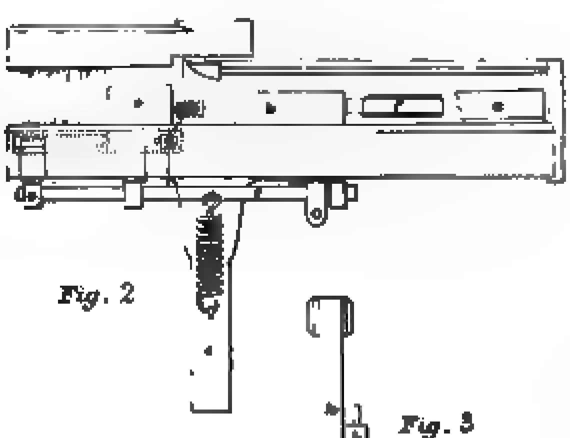

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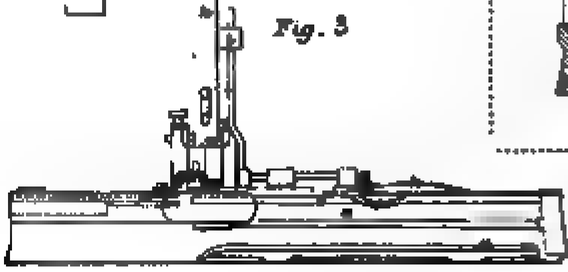

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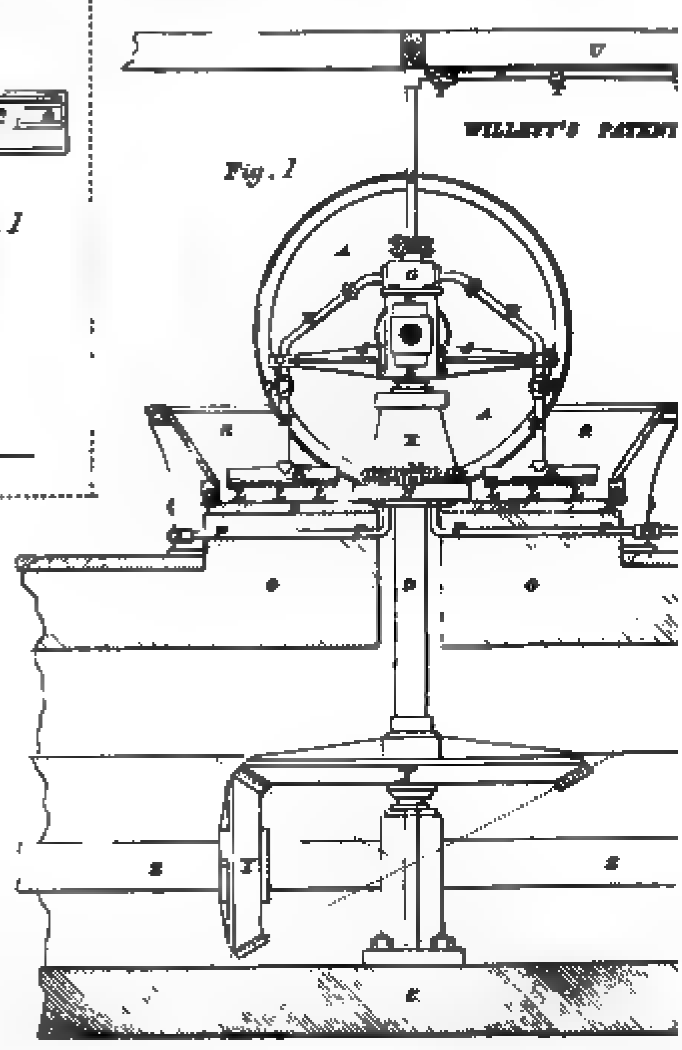

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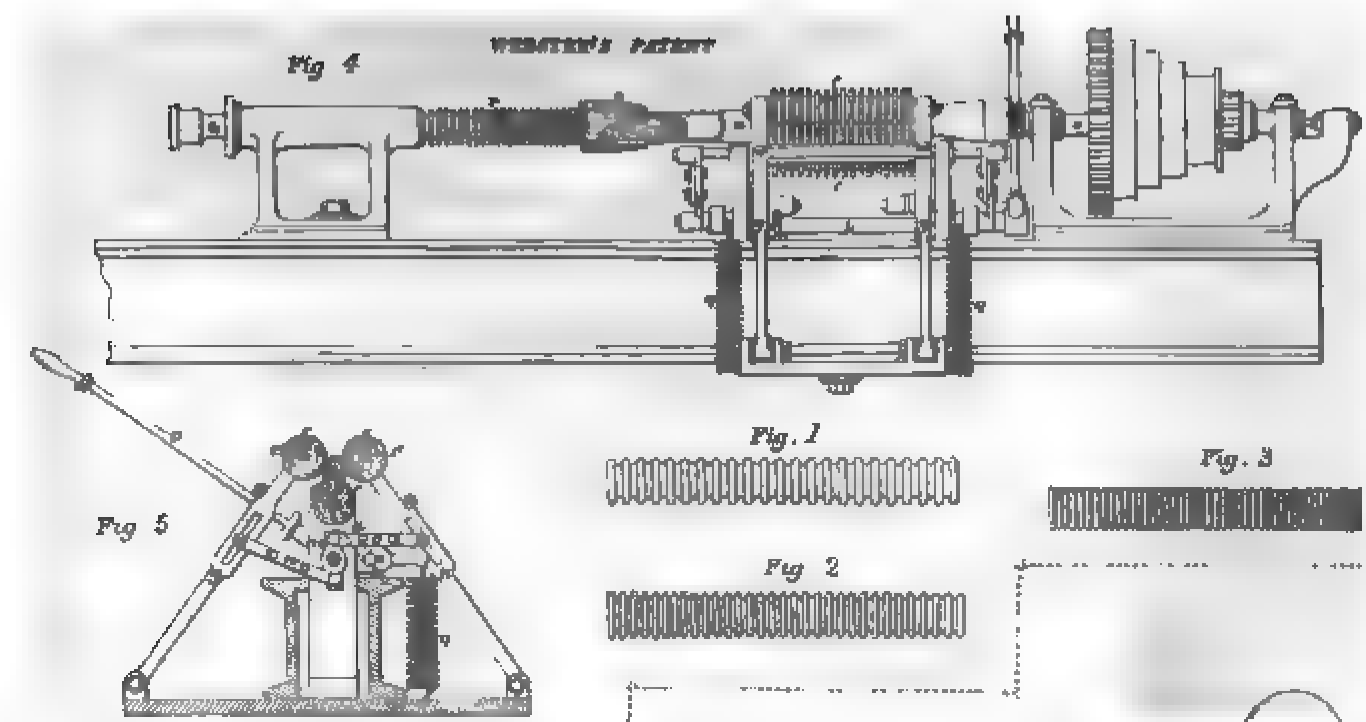
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Fig 4
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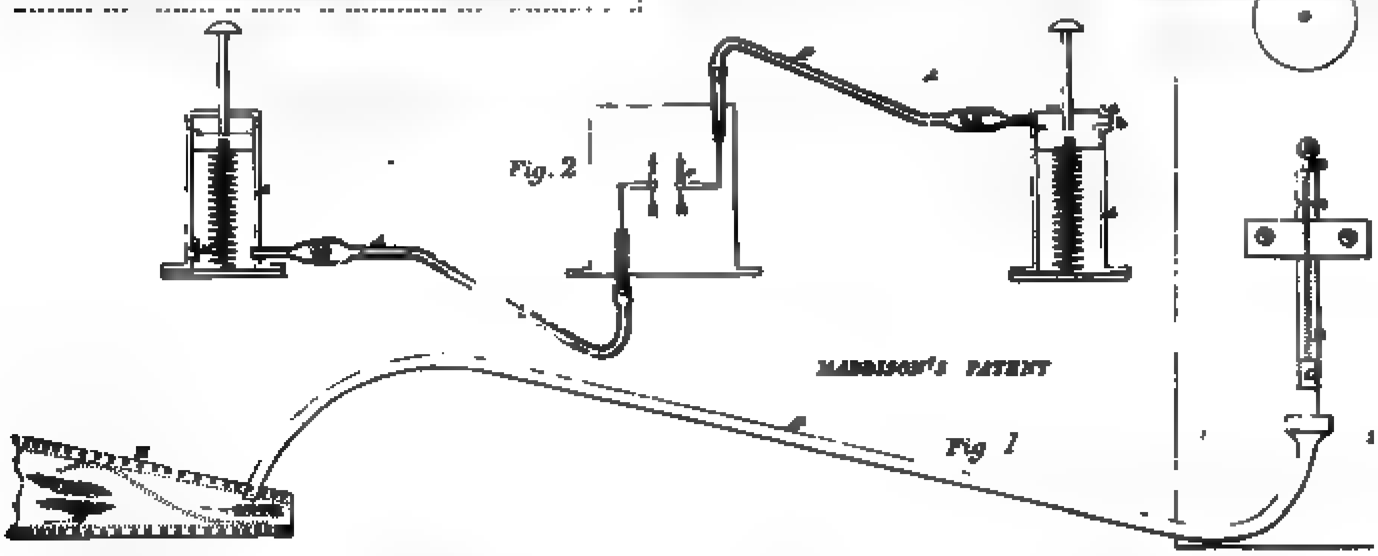
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MADDISON'S PATENT
Fig 1

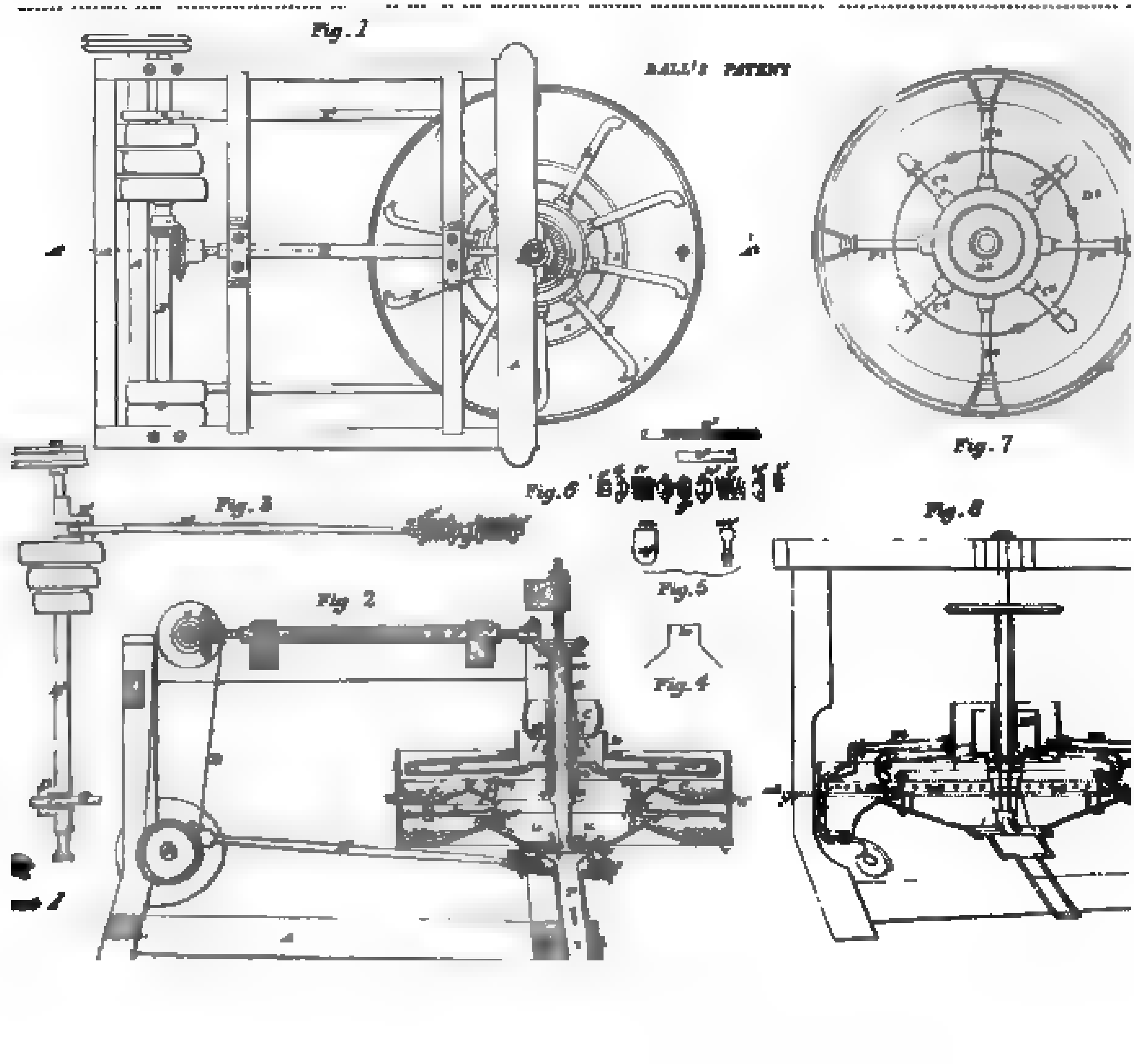
Fig. 1
BALL'S PATENT
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Fig. 5
Fig 2
Fig. 4

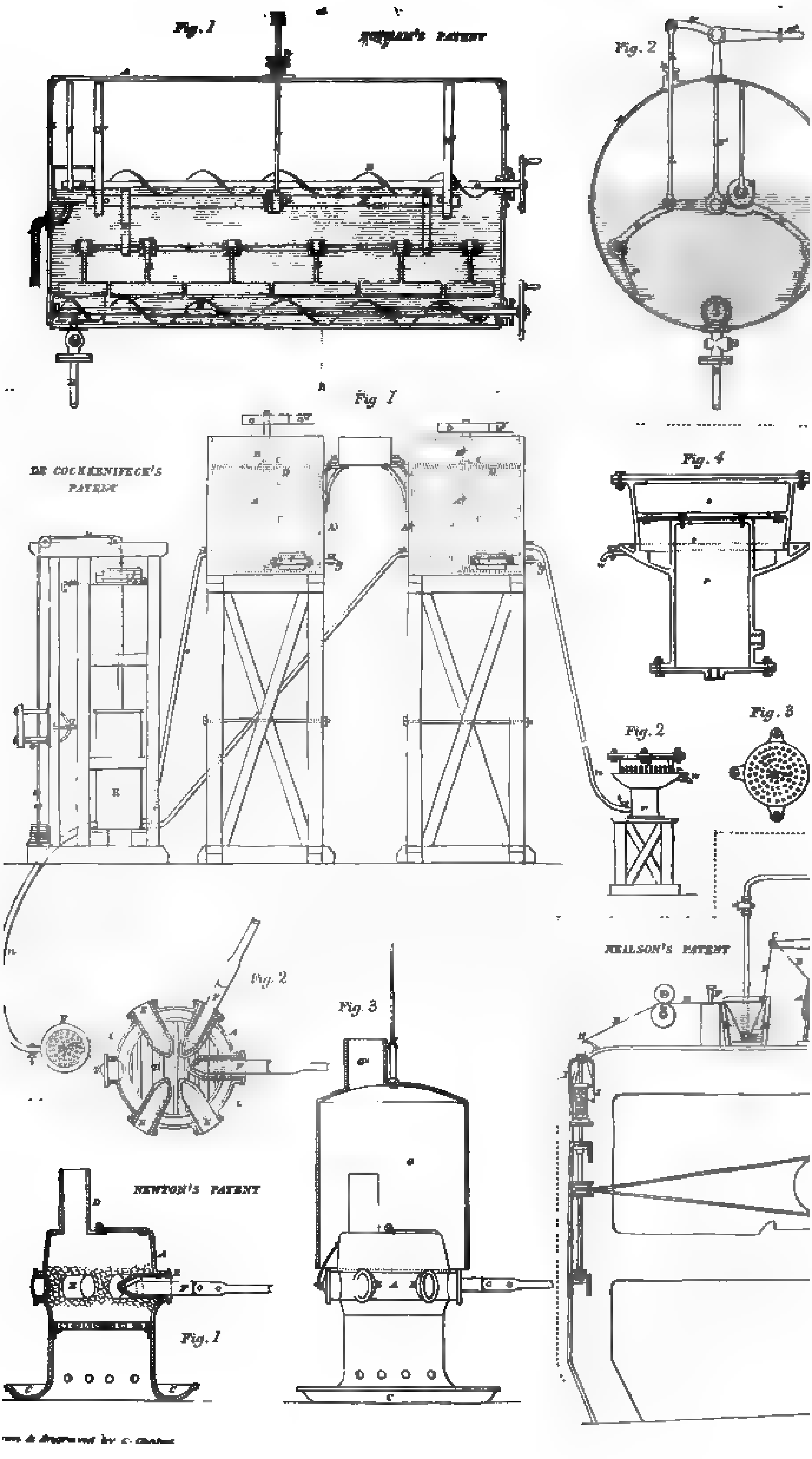

Fig. 1
Fig. 2
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DR COCKERNIFECK'S PATENT
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Fig. 2
Fig. 3
NEILSON'S PATENT
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NEWTON'S PATENT
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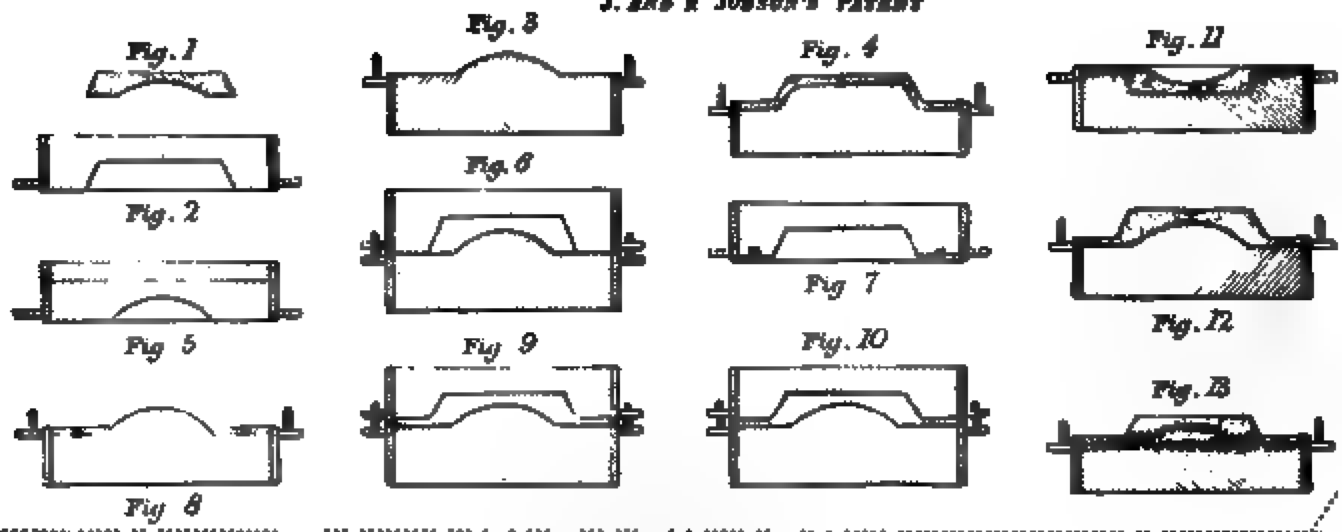
J. AND R. JOBSON'S PATENT



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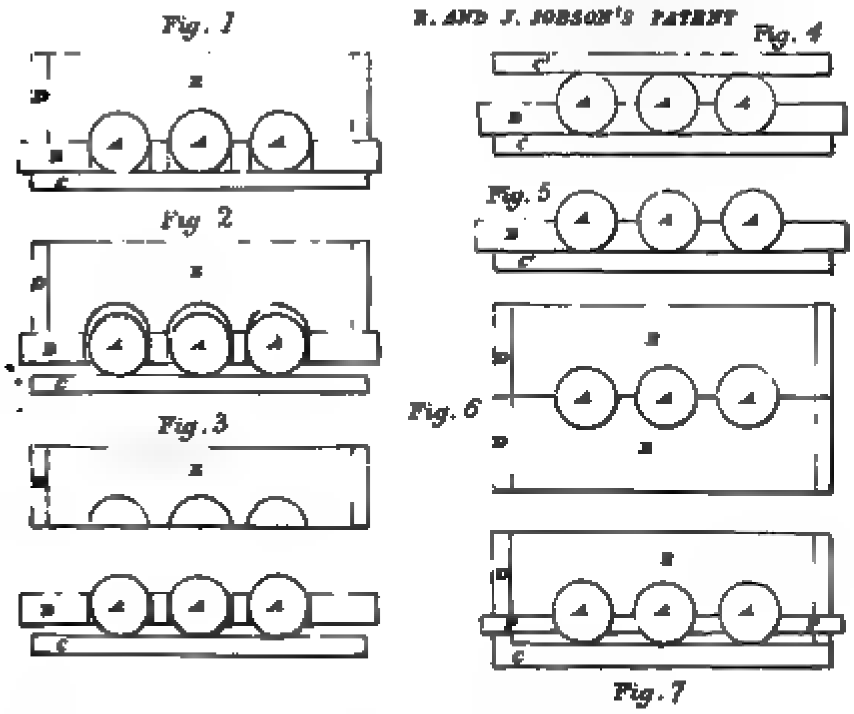

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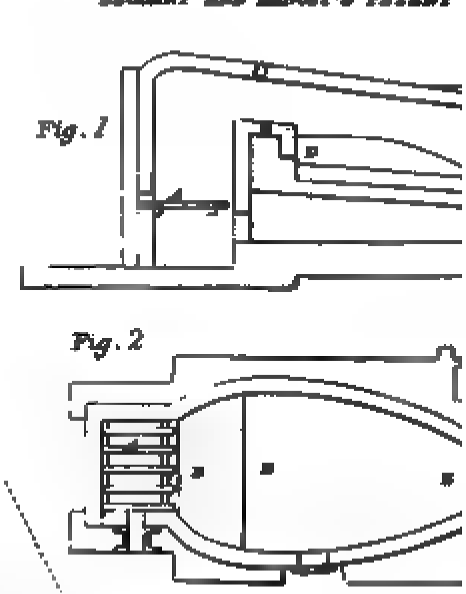

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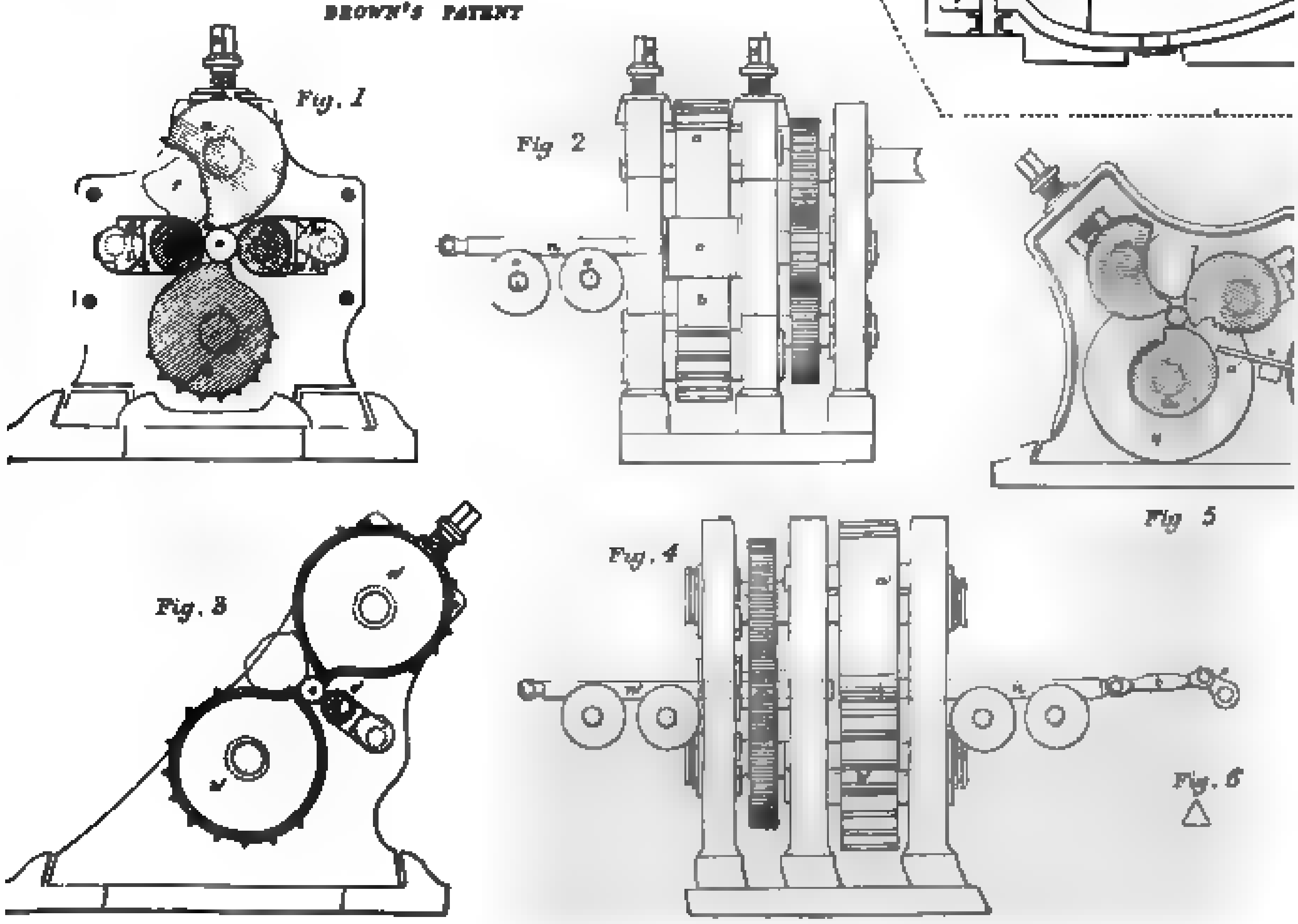

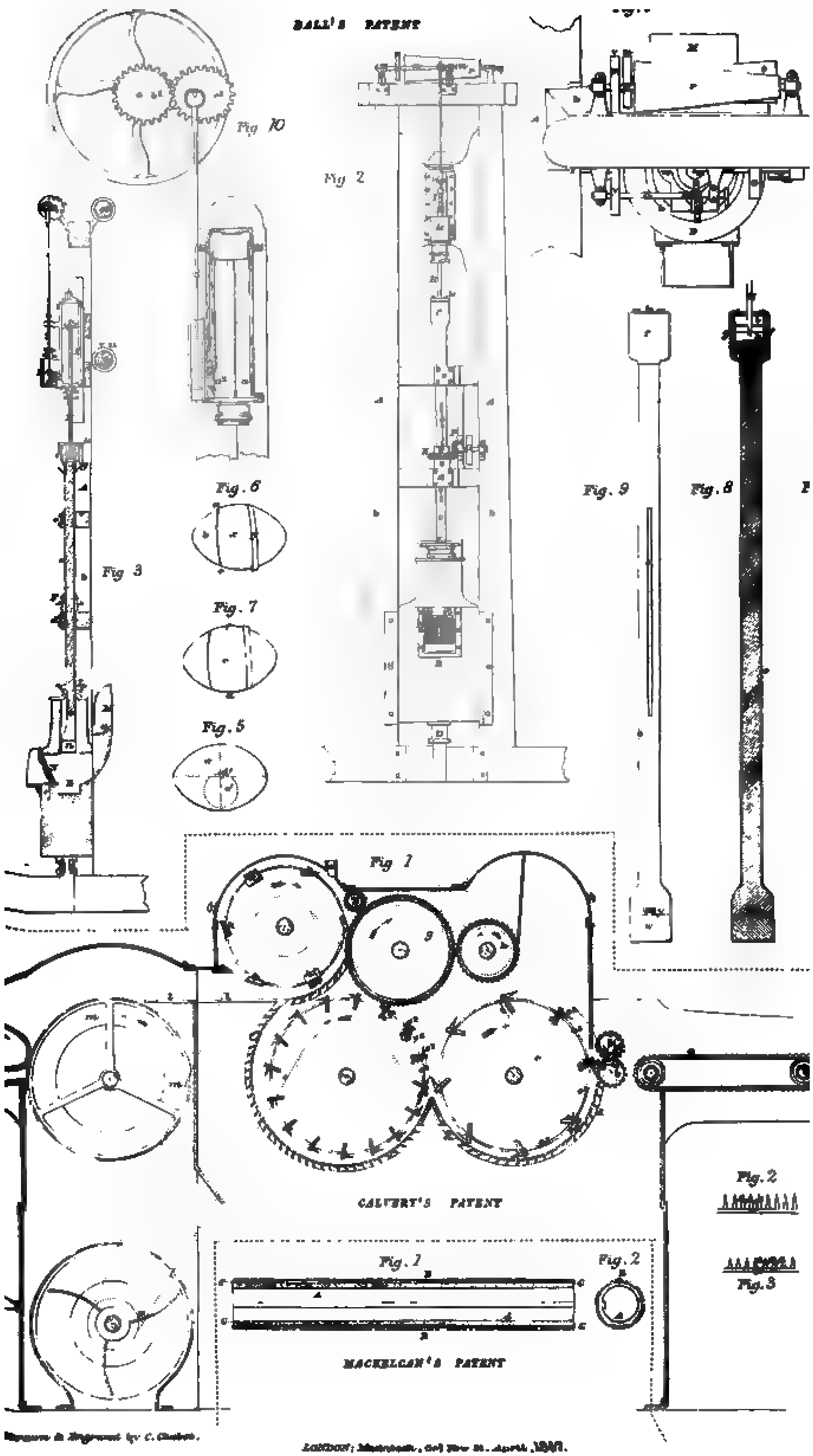
BALL'S PATENT
Fig 10
Fig 2
Fig 3
Fig. 6
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CALVERT'S PATENT
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MACKELCAN'S PATENT

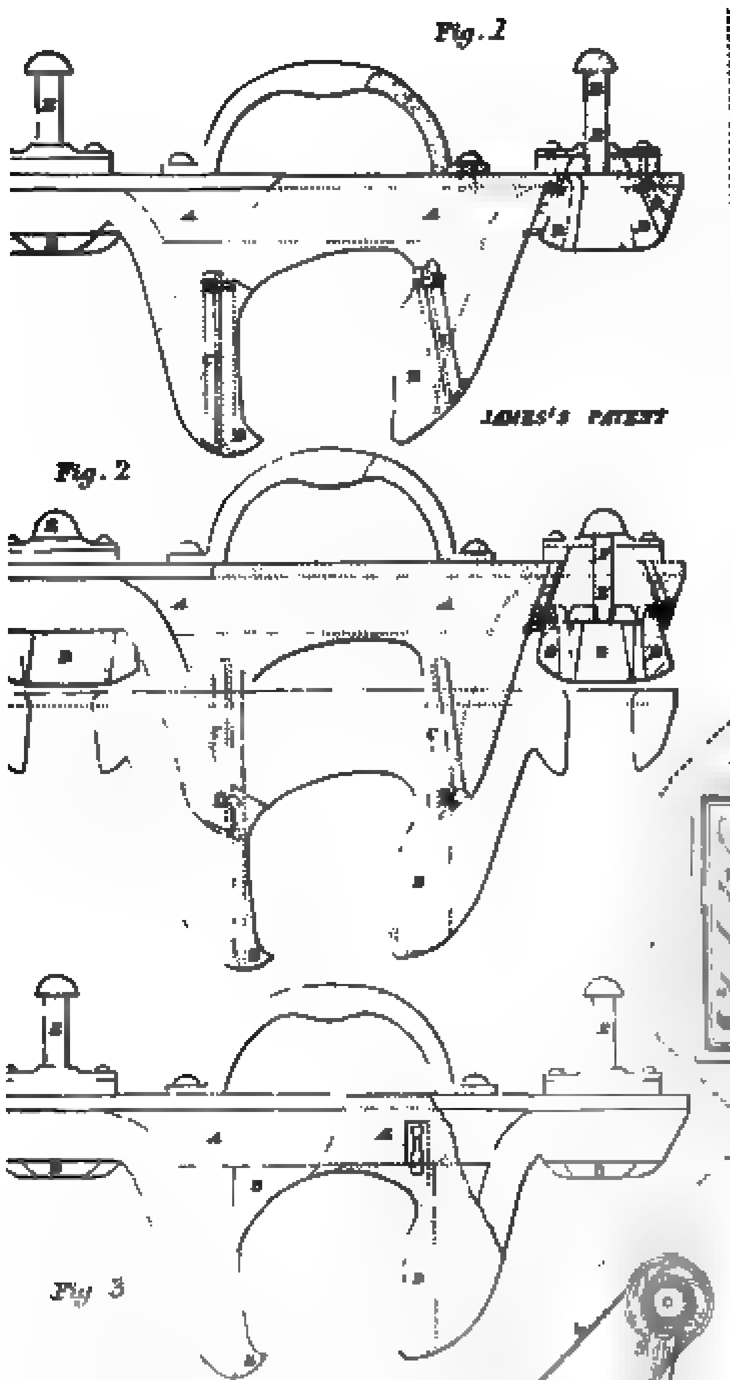


Fig. 1
JAMES'S PATENT
Fig. 2
Fig. 3

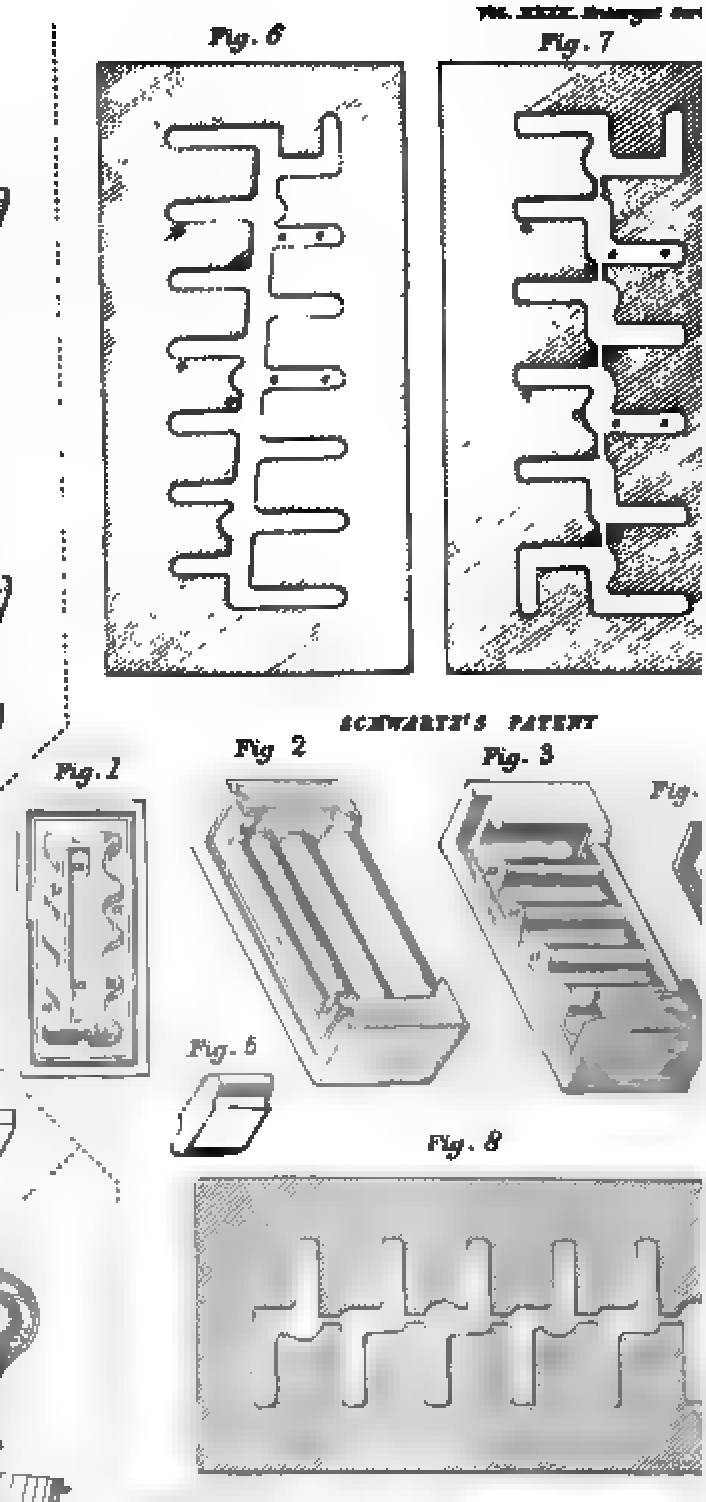
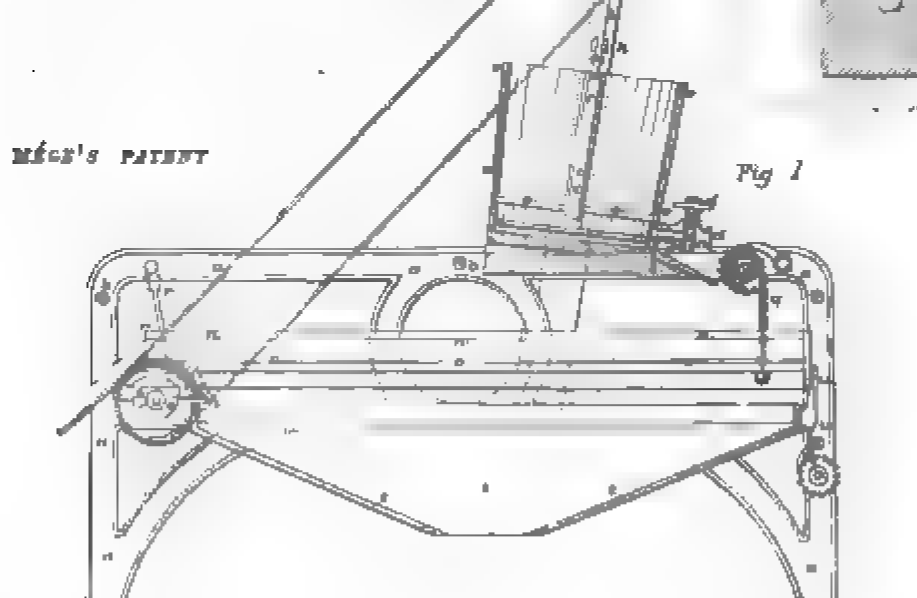


Fig. 6
Fig. 7
SCHWARTZ'S PATENT
Fig. 1
Fig. 2
Fig. 3
Fig. 5
Fig. 8


MÉGE'S PATENT
Fig 1

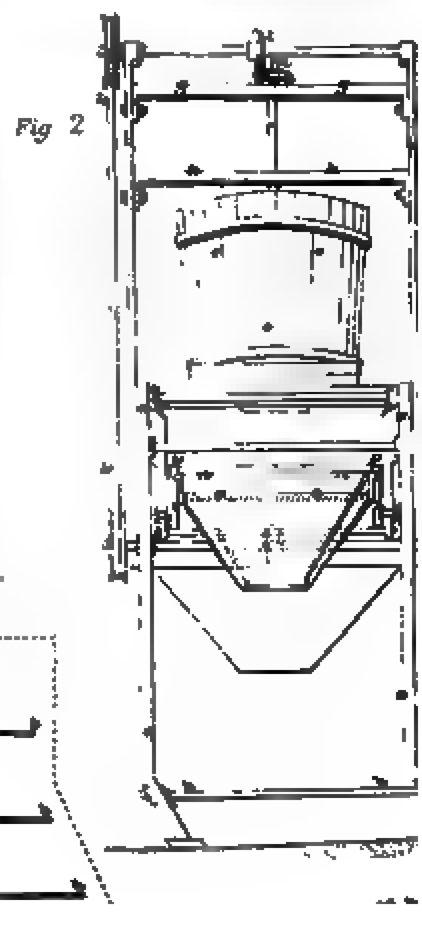
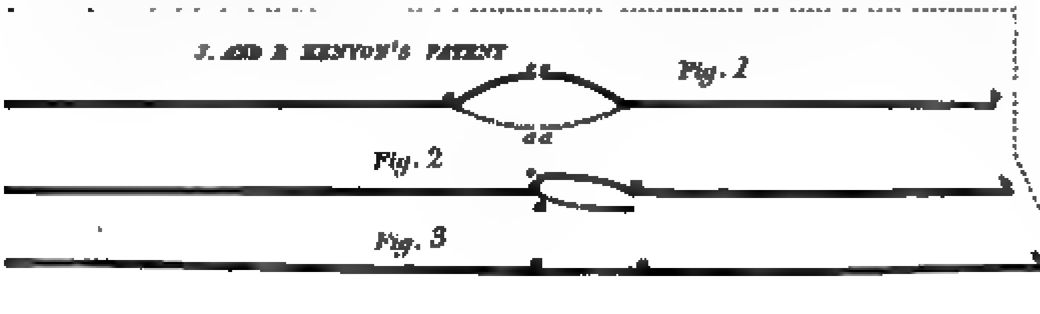
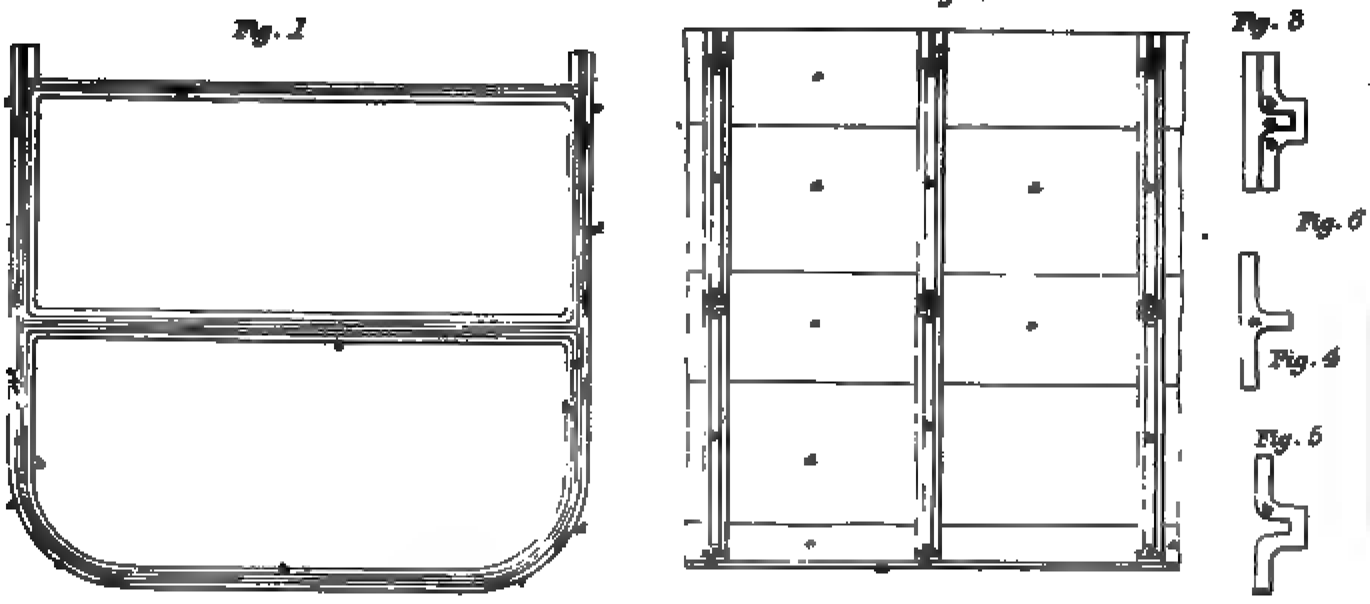


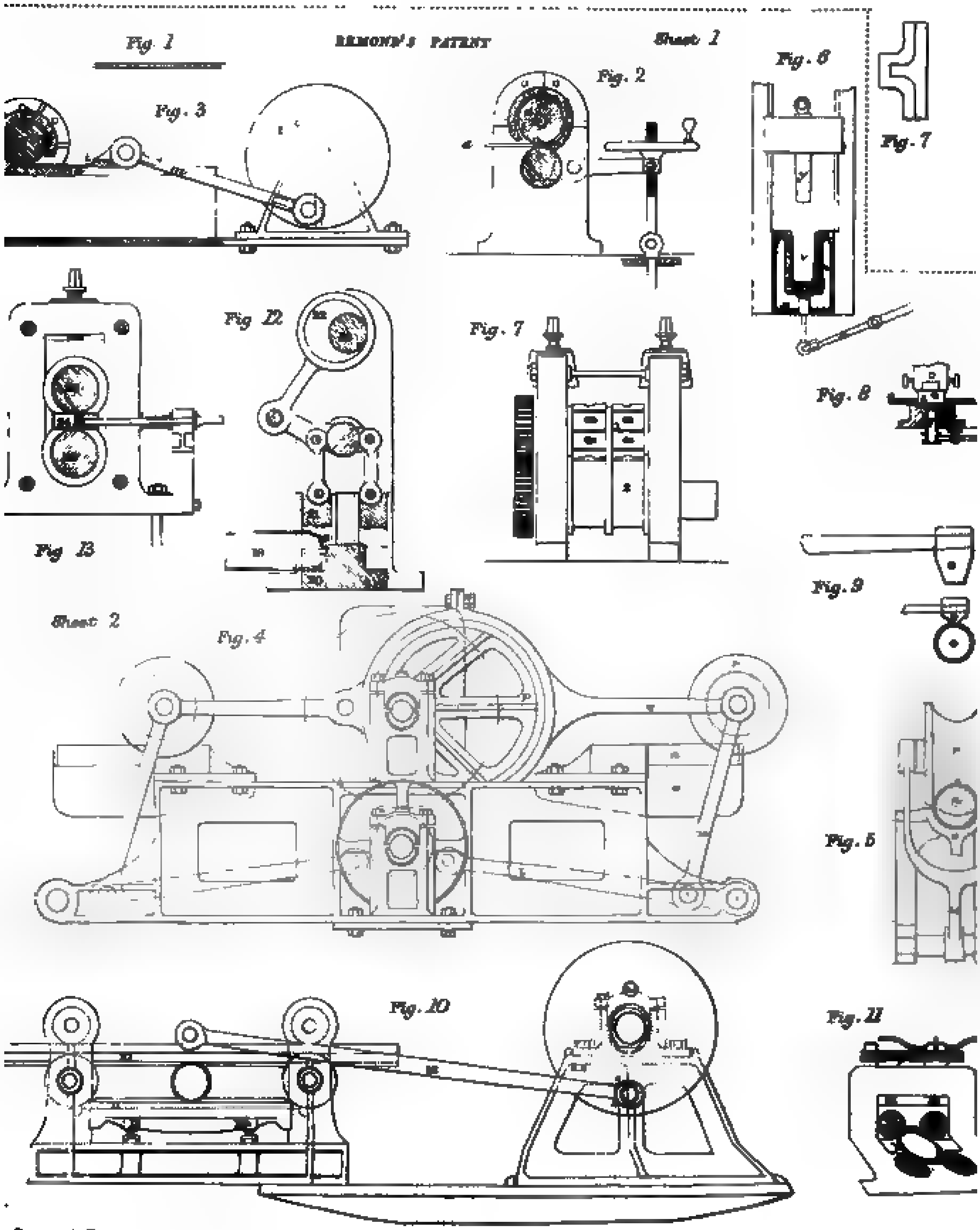
Fig 2


J. AND R. KENYON'S PATENT
Fig. 1
Fig. 2
Fig. 3

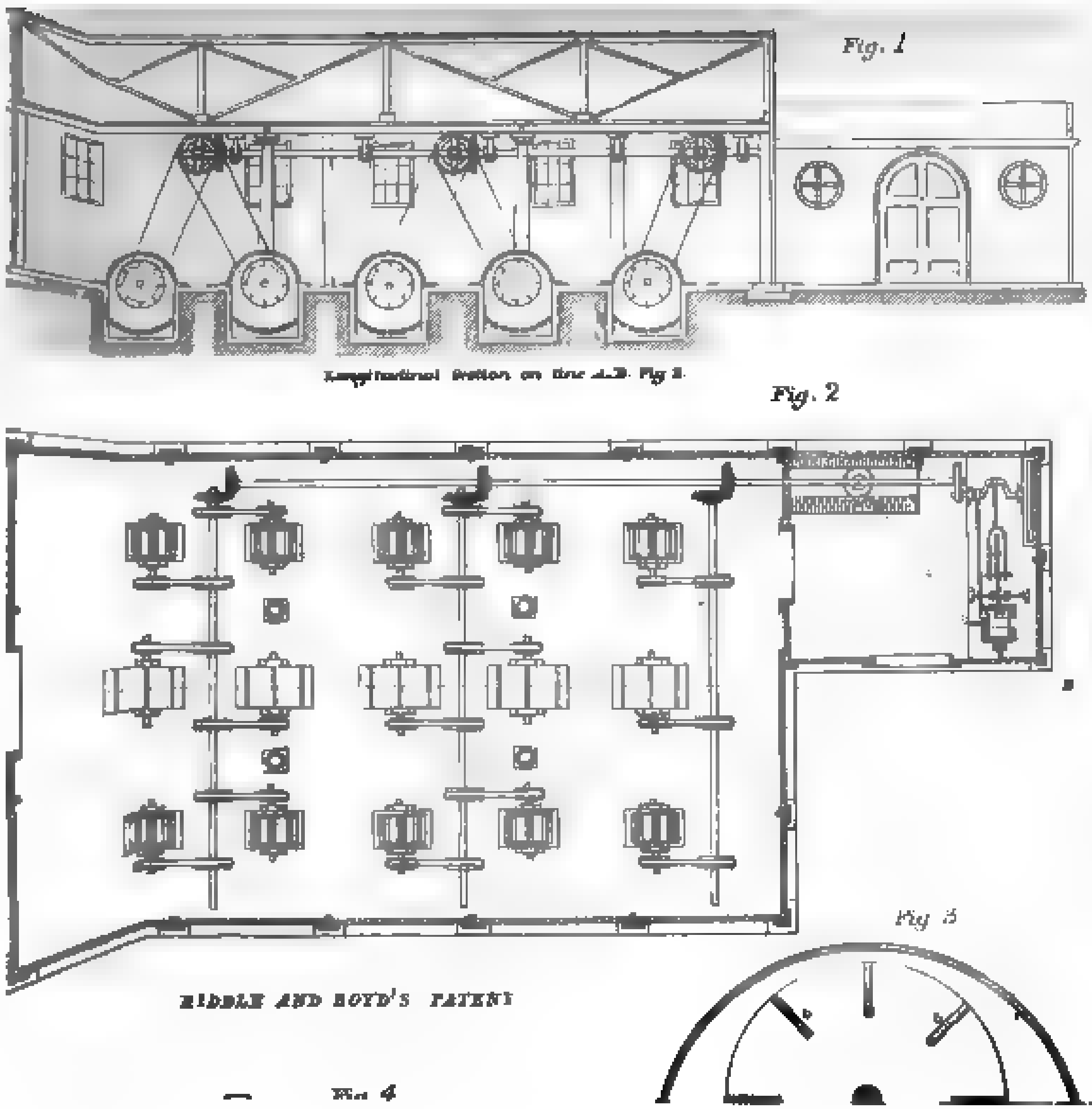
RADFORD'S PATENT



REMOND'S PATENT



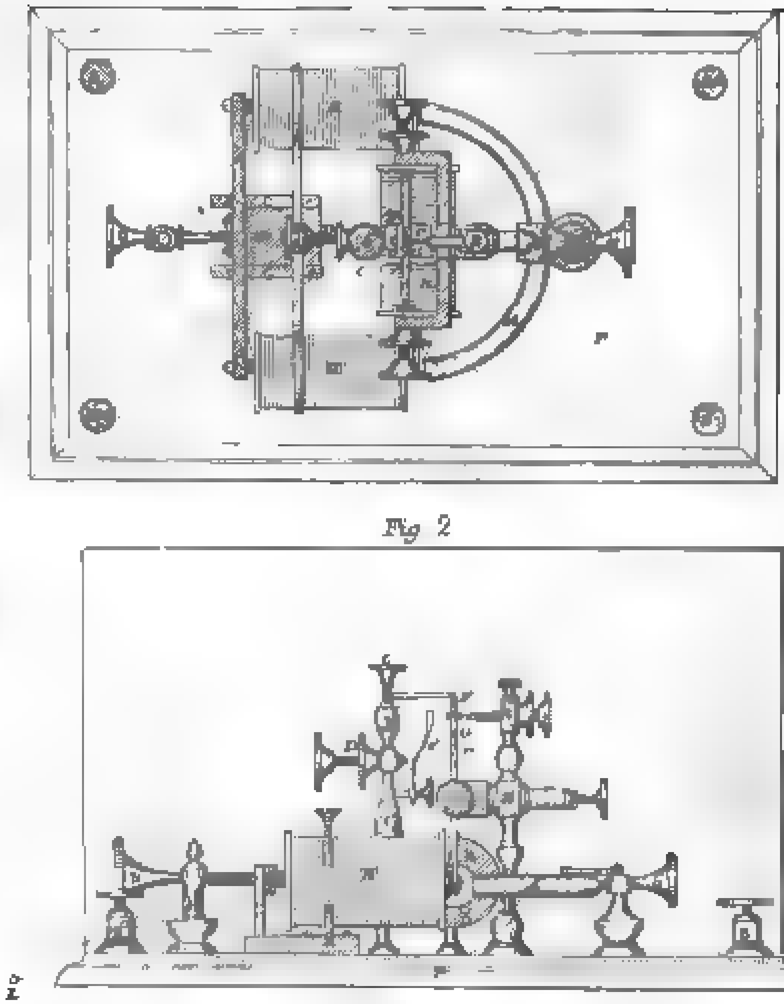
Drawn & Engraved by C. Graham.



RIDDLE AND BOYD'S PATENT

No. 4

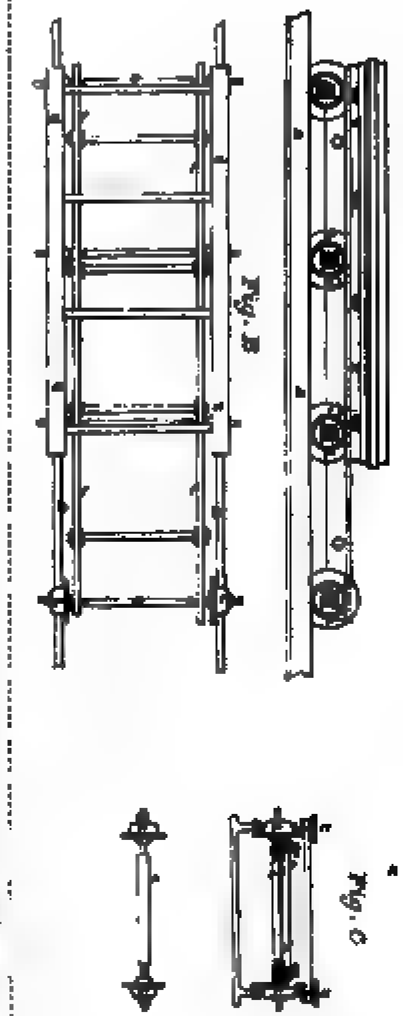
Fig 1



CHAMBLANT'S Fig. 2

No. 3

CHANCE'S PATENT



BLAKE'S PATENT

Fig. 3

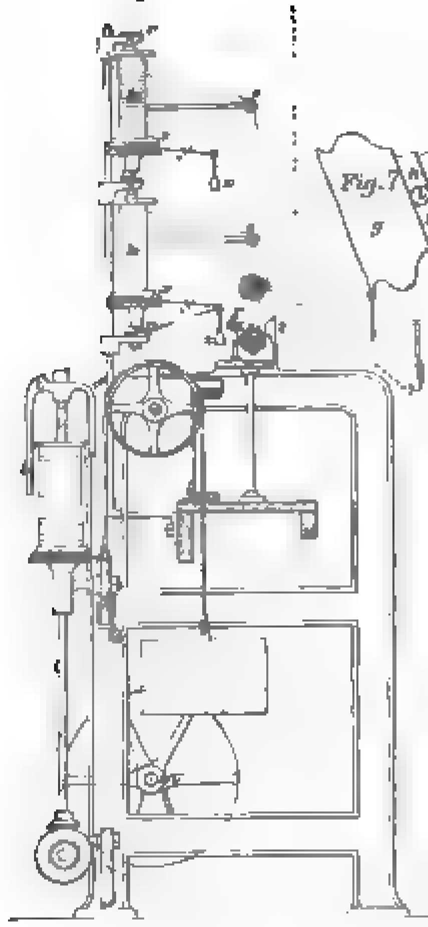
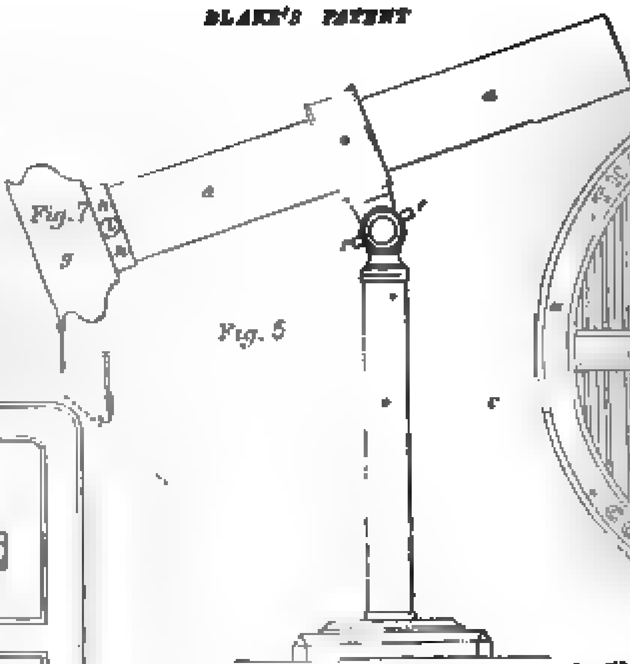


Fig. 7 · Fig. 5



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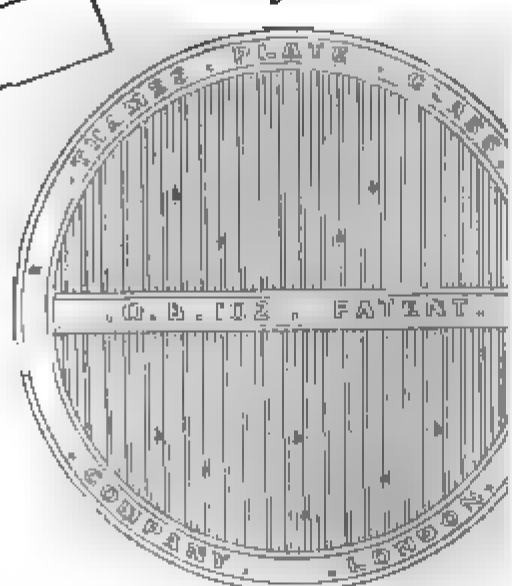


Fig.

Fig 6

Fig. 1

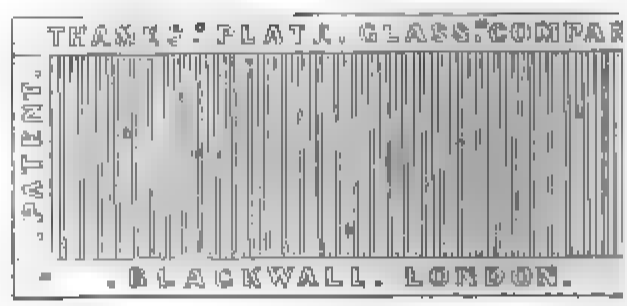
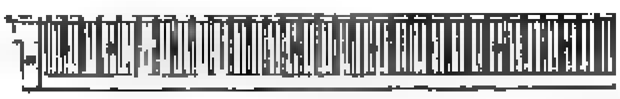
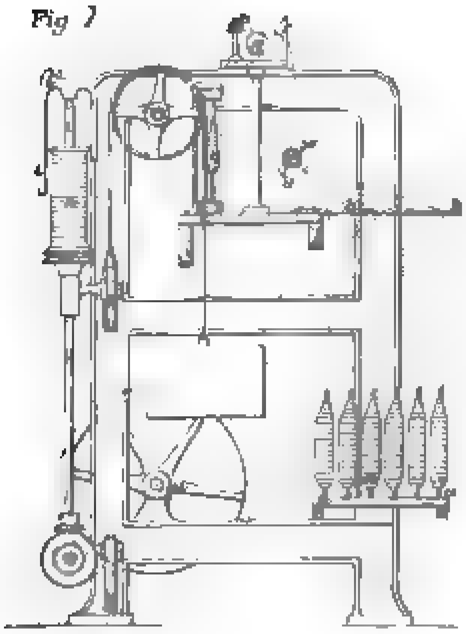


Fig. 2



HAGUE'S PATENT

Fig 1



ELLIS' PATENT

Fig. 1

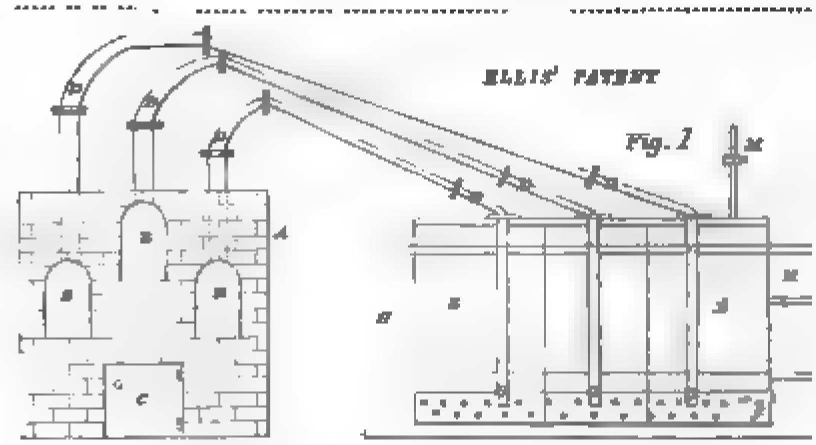


Fig. 2

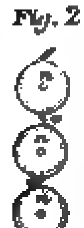


Fig. 4

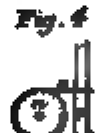


Fig. 3

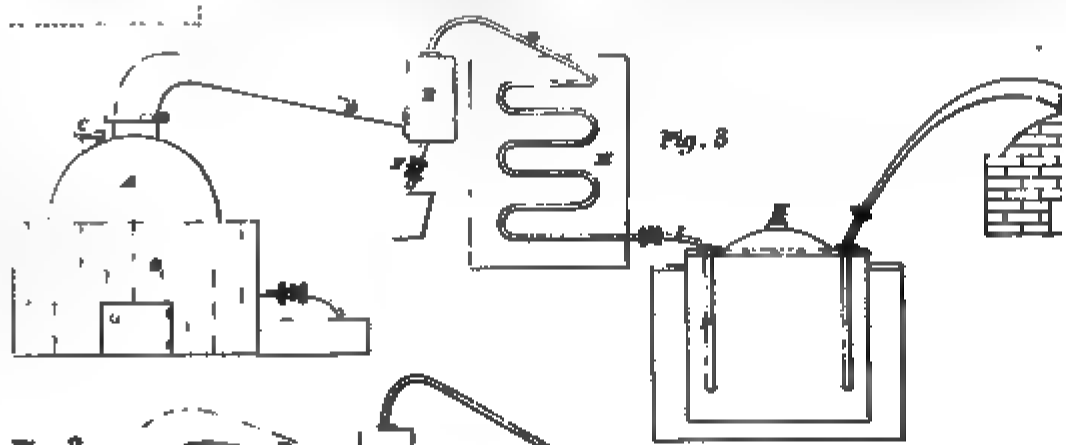


Fig. 2